



Human Environment and Transport
Inspectorate
*Ministry of Infrastructure
and Water Management*

Used vehicles exported to Africa

A study on the quality of used export vehicles



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Colophon

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Summary

The Human Environment and Transport Inspectorate (ILT) has proactively conducted a study on the quality of used vehicles exported from The Netherlands to African countries. The ILT has conducted this study to anticipate upcoming new and harmonised policies from African countries for the import of cleaner and safer vehicles and a new program of the United Nations Environment Programme (UNEP) on this.

We have investigated the actual quality of used vehicles for export to Africa and compared it to new import rules of West African countries.

Our conclusions are based on a desk study of data on export and fleet composition and physical inspection of vehicles destined for export in cooperation with the Netherlands Vehicle Authority (RDW).

This paper shows that over 80% of the used vehicles currently exported to West African countries will soon no longer be acceptable due to stricter environmental regulations of the recipient countries in West Africa (ECOWAS, Economic Commission of West African States).

The vehicles exported to these countries are old and below the Euro 4/IV emission standard, and they often do not have a valid periodic roadworthiness certificate. Around 20% of tested petrol vehicles fail tests for emission requirements. Many of these export vehicles, therefore, are a cause for pollutant and climate emissions and less road safety in the recipient countries.

There will be an imminent risk of highly-emitting diesel vehicles entering the export market to Africa as soon as the Netherlands and Germany introduce a new method to test the emissions of diesel vehicles.

Our study also shows that the quality of used cars exported to West Africa is quite similar to the quality of cars dismantled in the Netherlands. There are two aspects to this.

- Without a proper structure for disposal and treatment of end-of-life vehicles in African countries, uncontrolled treatment of vehicles, when discarded, cause environmental harm and injuries to health. There is also a risk of losing secondary raw materials.
- While a recycling fee has been paid for them in the Netherlands, only one out of three ends up in a recycling company in The Netherlands to be dismantled under controlled conditions and with a high rate of reuse of material.

As there is a massive market of cross-border trade of used vehicles within and outside the EU, a coordinated approach among European countries is essential.

We have therefore provided input to our Ministry of Infrastructure and Water Management, which is providing input for the evaluation and revision of relevant EU legislation by the European Commission in 2020/2021. In addition, the ILT has shared the findings of the study with UNEP, which is developing an international program called "Safer and Cleaner Used Vehicles for Africa".



Destination of used vehicles

In the Netherlands, every year, **more than half a million** used passenger vehicles are dismantled or transported abroad. The share that goes on transport every year is around 280,000.

Approximately 80,000 of these vehicles have a low emission standard (0, 1, 2 or 3) and are 16 years of age or older. Over a quarter of them end up in Africa.

280,000
passenger vehicles
transported abroad

80,000
vehicles

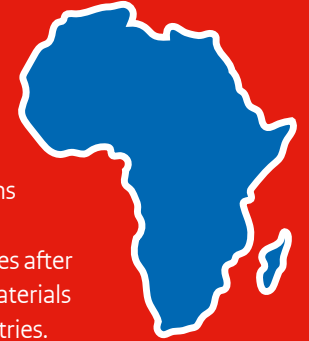


emission standard



Export to Africa

Vehicles currently exported to Africa resemble vehicles dismantled in the Netherlands. They are old and usually have an invalid periodic roadworthiness certificate. Often there are problems with the emission system (catalytic convertor and diesel particulate filter) and vehicles are below the Euro 4/IV emission standard. This leads to high emissions of particulate matter, NOx, CO₂, and risks to health and the environment due to uncontrolled treatment of vehicles after disposal. It also means a loss of valuable raw materials for the Netherlands and other exporting countries.



Export to other countries

The vehicles of 16 years of age or older also end up in Central Europe, the Russian region, and South America.



Recycling in the Netherlands

- Reuse of valuable (raw) materials
- Safe processing of hazardous substances

**January 1
2021**

**Import
restrictions**

Stricter import standards will apply to minimum emission standard (Euro 4/IV) and age in 15 countries in West Africa.

1 Introduction

1.1 Why this study?

The Human Environment and Transport Inspectorate (ILT) has proactively conducted a study on the quality of used vehicles exported from The Netherlands to African countries. The ILT has conducted this study to anticipate upcoming new and harmonised import policies from African countries to make their vehicle fleet cleaner and safer.

With this study, the ILT wants to assess how its instruments on used vehicles compare to the new import requirements of West African countries. With the results, the ILT aims to explore to what extent it can adapt/direct the functioning of its supervision to developments in Africa and perhaps other trends. The ILT has also started the study with the idea to provide input for:

- a new policy by the Ministry of Infrastructure and Water Management, which is currently providing input for the evaluation and revision of relevant EU legislation by the European Commission in 2020/2021.
- UNEP's new program on "Safer and Cleaner Used Vehicles for Africa."

This first required obtaining a representative picture of the actual quality of used export vehicles to African countries.

1.2 African countries move to a safer and cleaner vehicle fleet

The global fleet of light-duty vehicles (LDVs)¹ is set to double by 2050. Some 90% of this growth will take place in non-OECD countries, which import a large number of used vehicles.² A major global challenge to grow towards clean and safe road transport and to avoid excessive air pollution and climate change is the rapid growth of used vehicles in developing countries. The African continent is an example of this. In Africa, more than 60% of vehicles added to their fleet annually is through the imports of used vehicles.³ Road transport is contributing to a significant amount of emissions and air pollution, especially in urban areas. Old vehicles are usually less energy efficient, causing pollutant and climate emissions.⁴ Moreover, compared to other regions in the world, Africa has the highest rate of road traffic deaths at 26.6 per 100,000 people.⁵

EU countries dominate the trade of used vehicles to African countries, followed by Japan and the US.⁶

¹ LDVs are motor vehicles with at least four wheels for the carriage of passengers (no more than eight seats in addition to the driver's seat) and for the carriage of goods (and having a maximum mass not exceeding 3.5 tonnes. HDVs are motor vehicles with at least four wheels for the carriage of goods or passengers and having a maximum mass exceeding 3.5 tonnes.

² UNEP, *Used Vehicles and the Environment - A Global Overview of Used Light Duty Vehicles: Flow, Scale and Regulation* -, October 2020.

³ Ibid.

⁴ "The global vehicle fleet is a major contributor to air pollution and climate change. Vehicle emissions are a major source of small particulates (PM2.5) and nitrogen oxides (NOx) which, among others, are major sources of urban air pollution. The recent COVID-19 pandemic has shown that when transportation plummets, air quality improves significantly, especially in cities." UNEP, *Used Vehicles and the Environment - A Global Overview of Used Light Duty Vehicles: Flow, Scale and Regulation* -, October 2020.

⁵ WHO, *Global Status Report on Road Safety 2018*, [road_safety_status_2018](#)

⁶ "Over the 2015 to 2018 period, the EU exported around 7.6 million used vehicles to countries outside of the European Union. The principal destinations for EU exports are to West Africa and the EECCA block (Eastern Europe, Caucasus, and Central Asia). In 2018 alone, the EU exported slightly more than 1 million used light duty vehicles to Africa (out of a total import in Africa of about 1.5 million used light duty vehicles

Many African countries have made good progress in preventing the import of dirty, high sulphur fuels. This is good news after several publications, one of them from the ILT in 2018, which shows alarming results concerning the quality of fuels blended for West Africa.⁷

However, to reduce vehicle emissions drastically, vehicle quality needs to be improved as well.

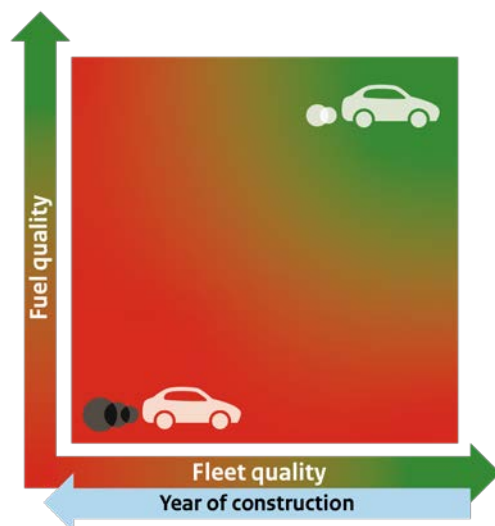


Figure 1.1. Variables affecting vehicle pollutant and climate emissions. ©ILT

More and more, African countries adopt policies for used vehicles import to improve air quality and road safety.

Egypt and South Africa, for example, have banned the import of used vehicles. Morocco has an age restriction for imported Light-Duty Vehicles (LDVs) and Heavy-Duty Vehicles (HDVs) of five years and requires vehicles to be at least Euro 4.⁸ Libya has set an age restriction of ten years for Light-Duty Vehicles and Heavy-Duty Vehicles in 2019.

Fifteen countries in West Africa (ECOWAS, Economic Commission of West African States) have jointly decided on new standards for clean fuels and vehicles.⁹ They agreed that as of 1 January 2021 all imported and newly registered vehicles would need to meet Euro 4/IV vehicles emission standards, and that the age limit for

that year)." UNEP, *Used Vehicles and the Environment - A Global Overview of Used Light Duty Vehicles: Flow, Scale and Regulation* –, October 2020.

⁷ Inspectie Leefomgeving en Transport, "Heavy fuel oil for sea-going vessels On-road fuels for West Africa Blended in the Netherlands", June 8, 2018 <https://english.ilent.nl/latest/news/2018/06/29/fuel-sector-not-complying-with-environmental-rules-increased-ilt-inspections-and> <https://english.ilent.nl/documents/reports/2018/07/04/heavy-fuel-oil-for-sea-going-vessels>

⁸ LDVs: motor vehicles with at least four wheels for the carriage of passengers (no more than eight seats in addition to the driver's seat) and for the carriage of goods (and having a maximum mass not exceeding 3.5 tonnes. HDVs are motor vehicles with at least four wheels for the carriage of goods or passengers and having a maximum mass exceeding 3.5 tonnes.

⁹ Joint meeting of ECOWAS Ministers in charge of hydrocarbons and environment, Ouagadougou, Burkina Faso, February 6, 2020. <https://www.unenvironment.org/news-and-stories/story/west-african-ministers-adopt-cleaner-fuels-and-vehicles-standards>

The subsequent Directive on the harmonisation of vehicle exhaust and particulate matter emission limits from light, heavy, two-wheel motor vehicles, tricycles and quadricycles was discussed by the ECOWAS Parliament and a resolution passed in July 2020, that the Heads of States have formally adopted on September 4-7 in Niamey, Niger.

importing vehicles is five years for light-duty vehicles and ten years for heavy-duty vehicles. Countries have been given ten years to adhere to the age limit. Nigeria and Ghana, both with a large vehicle and fuel market in the region, are part of the ECOWAS countries. This is the first harmonised used vehicles policy at a regional level in Africa. Similar initiatives are under development in East Africa and Southern Africa.

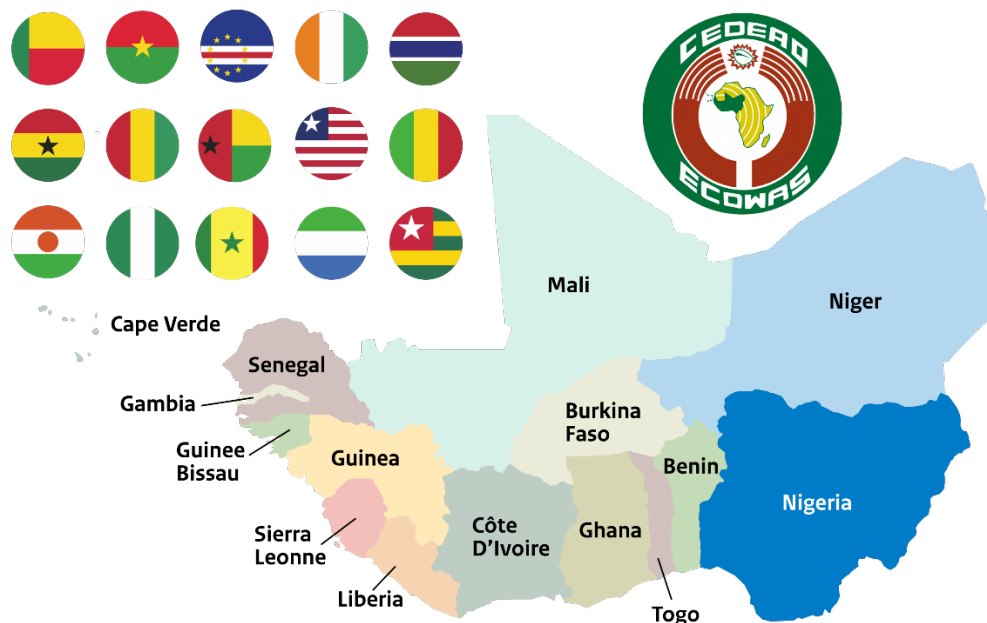


Figure 1.2. ECOWAS countries.

African countries could benefit (“leapfrogging”) from developments in technology, and increasingly stricter air emission requirements for vehicles in other parts of the world as many will eventually end up at their shores.

However, to be able to benefit from better vehicle technology fully, it matters what kind of used vehicles are exported. And these used vehicles still contain the emission and safety systems of when they are built. When important devices, like a particulate filter, a catalyst or an airbag system, do not function or are stripped off before export, the destination country will not be able to benefit.

UNEP’s new program

To support the African countries and to coordinate policies and efforts of importing and exporting countries, the United Nations Environment Programme (UNEP) is developing an international program called “Safer and Cleaner Used Vehicles for Africa” together with partners.¹⁰ It aims to establish minimum requirements for used vehicles intended for export to the African continent between the exporting and importing countries. This aims to bring forward a safer and cleaner fleet of vehicles on the African continent.

¹⁰ Partners include the UN Economic Commission for Europe, UN Economic Commission for Africa, World Health Organization, Federation Internationale d’Automobile (FIA), International Moto vehicles Inspection Committee (CITA), International Transport Forum (ITF) and several African regional organizations like the Arab Maghreb Union (AMU), The Economic Community of West African States (ECOWAS), The East African Community (EAC), The Southern African Development Community (SADC), and The Economic Community of Central African States (ECCAS).

1.3 The role of ILT in controlling used vehicles

Towards the end of their operating lives, used vehicles are either being driven in another country after export or dismantled.¹¹ For many old vehicles, it is obvious what the next destiny should be. It is the law of the market; if there is still someone willing to pay for the vehicle, the vehicle usually continues driving. Sometimes, however, the condition of the vehicles is such that dismantling is the only or best way forward. We call such vehicles end-of-life vehicles (ELVs). While the difference seems clear, both in practice and legal terms, the distinction between an ELV or a used vehicle for export can be a thin line. Without any further investigation/information and clear criteria, this line can be difficult to distinguish.

The ILT is the competent authority for the enforcement of two EU frameworks of environmental law affecting old and used vehicles:

- the EU Waste Shipment Regulation EC/1013/2006 ("EVOA").
- Directive 2000/53/EU on end-of-life vehicles (the "ELV" Directive).

It is our task to ensure that companies do not export end-of-life vehicles (a hazardous waste¹²) to non-OECD countries unless it concerns a depolluted ELV. It is also our task to monitor whether car manufacturers and importers of vehicles placed on the Dutch market set up systems for the collection, treatment, and recovery when they reach the end of their operating lives. This corresponds with the main objectives of the ELV Directive on:

- Extended Producer Responsibility
- providing incentives for environmentally-friendly vehicle design
- making dismantling and recycling of ELVs more environmentally friendly

In The Netherlands 'Auto Recycling Nederland' (ARN) carries out this program on behalf of most car importers.

The European Commission is currently evaluating and revising the EU Waste Shipment Regulation and the ELV Directive.

1.4 Objective of our study

The main objective of our research is twofold:

1. to assess the quality and state of exported vehicles to African countries.
2. to compare those results to the kind of used vehicles that West African countries will require for import now and in the near future.

In addition to the results, the study provides:

- suggestions and points of consideration for an effective national and international approach to improve the situation.
- information on the topic of vehicles with "unknown whereabouts."¹³

¹¹ "End-of-life" vehicles are vehicles of which its registration with the Netherlands Vehicle Authority (RDW) is cancelled for dismantling. In the context of this study, "used export" vehicles are understood to be second-hand or used vehicles of which its registration with the RDW is cancelled for export.

¹² ELVs, when not depolluted or treated, are classified as hazardous waste. Spilled or burned engine oil and unsafe FHC (Fluorinated and chlorinated hydrocarbons) handling from air conditioners can cause particular environmental and human health concerns. Unsafe handling of the acid from lead-acid batteries and unsafe treatment, e.g. burning of plastics from ELVs, also pose grave concerns. About six to twelve litres of liquids (other than fuels) are normally separated during the ELV depollution process per vehicle. The most important fluids are oil, coolants, windscreen washer fluid, fuel and brake fluid. Oeko-Institut, "Assessment of the implementation of the ELV Directive with emphasis on ELVs unknown whereabouts", December 2017, p1 <https://arn.nl/en/car-recycling/#links>

¹³ Vehicles of 'unknown whereabouts' are vehicles that are deregistered but without a Certificate of Destruction (CoD) issued or available to the authorities and also with no information available indicating that the vehicle has been treated in an Authorized Treatment Facility or has been exported. "Missing vehicles" in the EU are calculated on the balance between new registrations, net exports and ELVs reported by member states. Studies from the Oeko-Institut prepared for the European Commission in the context of the

1.5 The ILT's research in two parts

Our research consists of a desk study based on official registers for export and vehicle quality, and a field inspection of vehicles destined for export. The combination enables the authors to give an overview of the characteristics of used export vehicles and detailed information on the quality of a (limited) group of vehicles at the moment of export.

An innovative data analysis (desk study)

The desk study is an innovative analysis where our data analysts combine two types of data. These data come from Customs and the vehicle register operated by the Netherlands Vehicle Authority ("RDW").

Despite some limitations, the desk study provides a representative picture of used vehicles exported from the Netherlands.

It is expected that this analysis is representative of all the European exports to Africa. After all, as shown in figure 1.3, the average age of passenger cars and light and heavy-duty commercial vehicles in The Netherlands is quite similar to the EU average and average ages of vehicle fleets:

- in the countries around the Netherlands
- the EU countries with the largest vehicles' fleets

The Netherlands is seventh in the EU with the largest vehicles fleet. See the table below.

EU vehicle fleets in 2018 + average age	Passenger cars		Light commercial vehicles		Medium and heavy commercial vehicles	
	in millions	average age	in millions	average age	in thousands	average age
Germany	47.1	9.5	2.7	8.0	947	9.5
Italy	39	11.3	4.1	12.4	896	14.0
UK	34.9	8.0	4.4	7.8	605	7.4
France	33	9.0	6.2	9.5	564	7.2
Spain	24.1	12.4	4.6	12.8	567	14.4
Poland	23.4	13.9	2.6	13.8	1,109	13.2
Netherlands	8.8	10.6	0.99	9.5	168	9.1
Belgium	5.8	9.0	0.8	8.6	146	15.9
Denmark	2.6	8.8	0.4	8.4	43	10.3
Ireland	2.1	8.4	0.4	8.8	53	10.4
EU	268	10.8	33.2	10.9	6.6 million	12.4

Author's compilation based on ACEA_Report_Vehicles_in_use-Europe_2019

Figure 1.3: Composition and age of EU vehicle fleets.

assessment of the implementation of the ELV Directive demonstrate that the number of vehicles of unknown whereabouts in the EU is about three to four million vehicles per year, compared to around six to seven million ELVs treated in compliance with the ELV Directive.

The field inspections

The practical part of our research is a three-day field inspection that has taken place in the port of Amsterdam in December 2019. There, the ILT has collaborated with experts of the Netherlands Vehicle Authority. We have focused on collecting information on the emissions, the state of the vehicles, and the registration. The field inspection has provided qualitative data. While it offers a snapshot, an indication of the state of used vehicles exported to Africa at that moment in time, the pilot has value. It does not only confirm our findings of the data analysis. It also provides some new important findings that a theoretical study has not provided. Policymakers developing a new policy on export and import of used vehicles for Africa can take these insights into account.



Vehicles for export to West African countries © ILT December 2019

2 Findings of the desk study

2.1 Our approach

There is a huge market of cross-border trade of used vehicles within the EU. In 2017 and 2018, for example, the Netherlands exports 655,410 Light and Heavy-Duty Vehicles. The Netherlands only dismantles 482,258 vehicles. The majority of exports concerns cross-border trade with the EU.

We focus on a much smaller group of vehicles: those exports declared to Dutch customs, covering mostly exports to outside the EU.¹⁴ In 2017 and 2018, this number is 156,201. Of this, 37,845 LDVs and HDV are exported to fifty different African countries in 2017/2018. West Africa and North Africa are among the five largest regions of non-EU-destinations for these vehicles.

For our desk study, we assess the vehicles exported to the top 12 countries in Africa: 30,083. These are three countries in North Africa (12,404 vehicles), eight (ECOWAS) countries in West Africa (17,868), and one country in East Africa (1,068 vehicles).¹⁵ These *export data* cover:

- Dutch registered vehicles exported from Dutch ports and unknown ports. A small part of vehicles has been exported from ports in other countries, such as Antwerp.
- Foreign registered vehicles of which many are German, exported from Dutch ports.

Customs data contain, inter alia, information on the good, such as a description of the good, and the country of destination, the country of the recipient, the place of custom clearance, and value (price). The second source of data comes from the RDW vehicle register 2017-2018. This data contains a wide variety of information for each vehicle registered in the Netherlands, such as:

- the date of first registration in the Netherlands
- vehicle type
- fuel type
- vehicle brand
- emissions standard
- Periodic Roadworthiness Test expiry date
- mileage
- status like dismantling or export.

Combining the two databases allows us to draw up a good picture of used export vehicles to Africa. Please note the following:

¹⁴ Although export of vehicles to EU countries do not need to be declared to customs, it regularly occurs.

¹⁵ The customs *export data* that we use for our analysis are the goods declared under the customs codes:
- 8703 Vehicles and other motor vehicles designed for transport of persons and
- 8704 Vehicles for transport of goods.
- 8702 Vehicles for the transport of ten persons or more, including the driver.

For the analysis of the top 12 countries, we have left out of our analysis the export buses under custom code 8702 as they concerned small numbers.

Note that besides the customs database of *export declarations*, there is also a database with *exit declarations*. The *export declaration* shows the intent of the owner of the good to export while the *exit declaration* happens at the time of physical export of the good to a country outside the EU. There can be time between the two declarations, and they can be in two different EU countries. The number of vehicles exported to African countries that we have assessed are nearly 35,000 in 2017 and 2018. We believe that the number of vehicles physically leaving Dutch ports to all African countries are around 44,000 in 2017/2018. According to UN Comtrade figures (customs codes 8703, 8704), exports in 2017 are around 20,000 and around 24,000 in 2018.

- The two databases use different vehicle categories and definitions. We have done our best to distinguish between Light-Duty Vehicles (LDVs) and Heavy-Duty Vehicles (HDVs)¹⁶. In general, LDVs are passenger cars and light commercial vehicles, such as vans. HDVs are mostly heavy commercial vehicles, such as trucks.
- Combining two databases seems simple. In practice, however, we have encountered several obstacles. For instance, many Customs export declarations do not state the unique number of a vehicle (the vehicle identification number (VIN) or a license plate number).
- In addition, many used export vehicles are registered abroad. Consequently, we cannot match them with the vehicle information present in the RDW register.
- When we are able to match two vehicles, we also refer to them as “retrieved” vehicles in this paper. Matched vehicles are only Dutch-registered vehicles from the whole group of vehicles exported from the Netherlands to African countries.
- For some export countries, the retrieval rate is good, while for others, the retrieval rate is meagre.

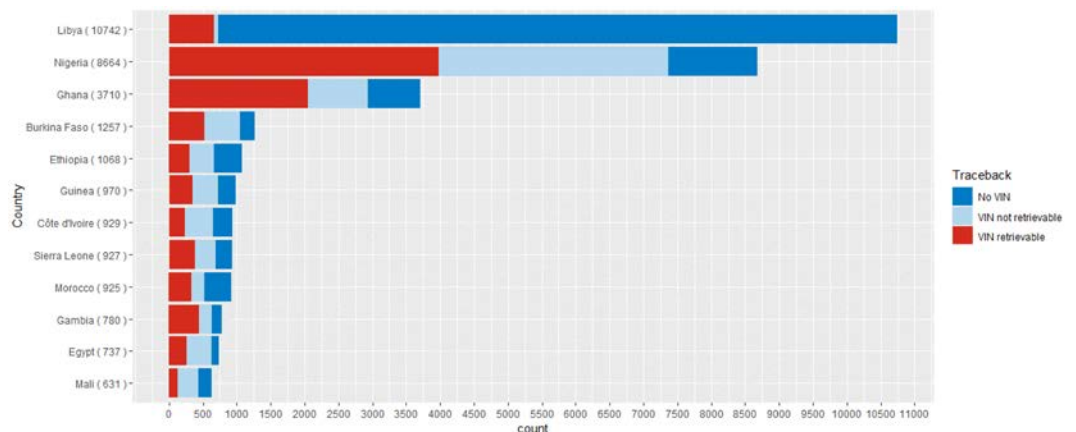


Figure 2.1. Retrieval rate of top 12 destinations. Data: combined Customs and RDW. ©ILT-IDlab

- The retrieval rate for Libya, which is the main destination of export vehicles from the Netherlands, is very low because “export declarants” rarely fill out the VIN or license plate number for vehicles exported to Libya. As a result, our findings might not be representative of all vehicles exported to Libya. So, we have extensively analysed them, using only data from the Netherlands Vehicle Authority (RDW).¹⁷
- Although the majority of the vehicles exported to Africa declared to customs are used vehicles, a small and unknown part consists of new vehicles. This does not have a significant impact on our findings because new cars show in the in-depth analysis of age information from the vehicles retrieved. For example, the figures 2.3 and 2.4 on page 16 and 17 show some young (new) vehicles, but these are low numbers.

¹⁶ LDVs: motor vehicles with at least four wheels for the carriage of passengers (no more than eight seats in addition to the driver's seat) and for the carriage of goods (and having a maximum mass not exceeding 3.5 tonnes). HDVs are motor vehicles with at least four wheels for the carriage of goods or passengers and having a maximum mass exceeding 3.5 tonnes.

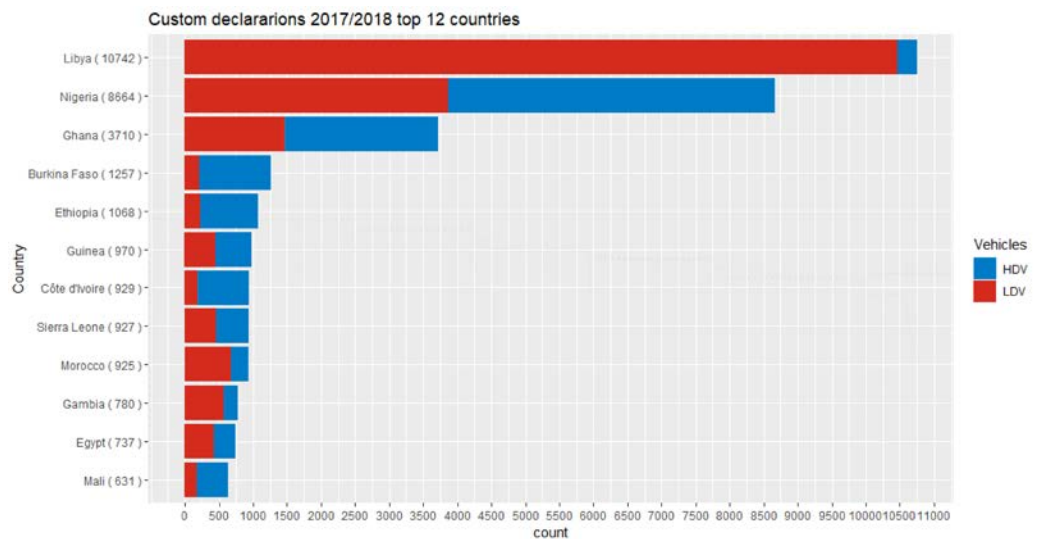
¹⁷ We have observed that the vast majority of matched/retrieved vehicles exported to Libya have been deregistered for export from the RDW register by someone with a Libyan nationality. Therefore, we have decided to analyse all deregistered vehicles for the RDW database that had (1) the status “export” and (2) a Libyan national as export declarant. We cannot exclude that some of these exported vehicles did have another destination than Libya, like Sudan.

2.2 Destinations of used export vehicles

The following twelve African countries are the main export destinations of the Netherlands.

Figure 2.2. Types of vehicles to top 12 destinations. Data: Customs. ©ILT-IDlab

Libya, Nigeria, and Ghana are the top 3 destinations. This is not surprising. With a joint population of over 225 million inhabitants, Nigeria and Ghana have the largest fuel and vehicles markets in West Africa. Libya, while having less than 7 million inhabitants, has a high number of new vehicle registrations annually and a high number of vehicle registrations per thousand residents compared to Ghana and Nigeria.¹⁸ We also note, and show in figure 2.8 and the following chapter, that despite Libya's new age restrictions on used import vehicles, the vehicles exported to Libya are much older. Increasingly more, the country seems to function as an important gateway for used vehicles moving to other countries in the region, like Sudan, Chad, Niger, and possibly up to West African countries, like Nigeria and Mali.¹⁹



predominantly diesel.

¹⁸ In 2016, for example, Ghana, Nigeria and Libya have respectively 7,400, 23,000, and 31,600 new vehicle registrations (covering passenger and commercial vehicles). In 2015, Ghana, Nigeria and Libya have respectively 890,000 (63% passenger/37% commercial), 3.8 million (79.2% passenger/20.8% commercial) and 2.7 million (79.2% passenger/20.8% commercial) vehicles in use. <https://countryeconomy.com/countries/>

¹⁹ UN Comtrade statistics (custom code 8703) show that exports of vehicles to Libya from Belgium, The Netherlands, and Germany together have increased greatly since 2016. These are the numbers: 2016: 2,997. 2017: 10,174. 2018: 25,825. 2019: 121,029.

Most popular brands

The brands most popular in LDV exports from the Netherlands to the top 3 countries in 2017/2018 are:

- Libya: Opel, Mazda, and Hyundai.
- Nigeria: Peugeot, Toyota, and Volkswagen.
- Ghana: Kia, Mercedes, Hyundai, and Toyota.

Validity of roadworthiness certificate (only Dutch-registered vehicles)

Vehicles used on public roads in the EU are required to be roadworthy. Periodic Roadworthiness Tests (PRT) are the primary tool to ensure that vehicles driving on public roads in the EU are kept in a safe and environmentally-acceptable condition during their use. A roadworthiness certificate is issued to the owner of the vehicle passing the test.²⁰

Figures 2.3 and 2.4 show that most used vehicles do not have a valid roadworthiness certificate (in Dutch “geldige APK”) at the time of export to African countries. We also observe that in almost each age group and country, a small number of used vehicles have a valid roadworthiness certificate. Of those, several expire within one month.

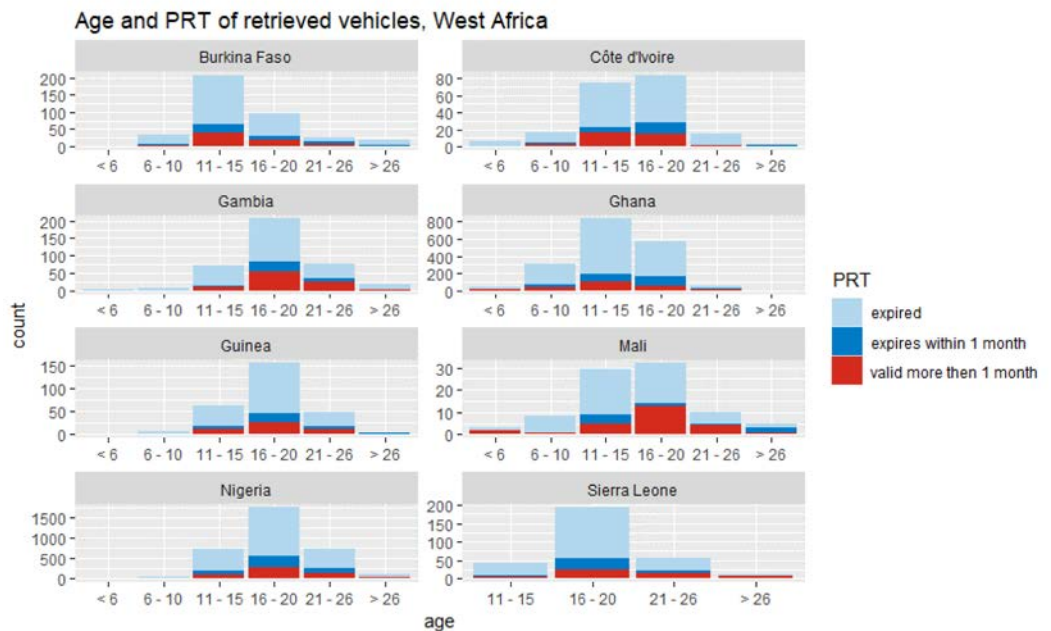


Figure 2.3. Age and PRT of retrieved vehicles to West African countries in the top 12.

Data: combined Customs and RDW. ©ILT-IDlab

²⁰ Directive 2014/45/EU sets out the technical standards for vehicles inspection by EU countries: in respect of vehicle safety and emissions. This Directive establishes minimum requirements for a regime of periodic roadworthiness tests of vehicles used on public roads in the EU. Member States are allowed to set higher test standards than those required by the Directive. A roadworthiness certificate should be issued after each test. This should include, inter alia, information concerning the identity of the vehicle and the results of the test. The test results should be made available electronically. To ensure a proper follow-up of roadworthiness tests, Member States should collect and retain such information in a database. Consequently, the results of the periodic roadworthiness tests can be analysed.

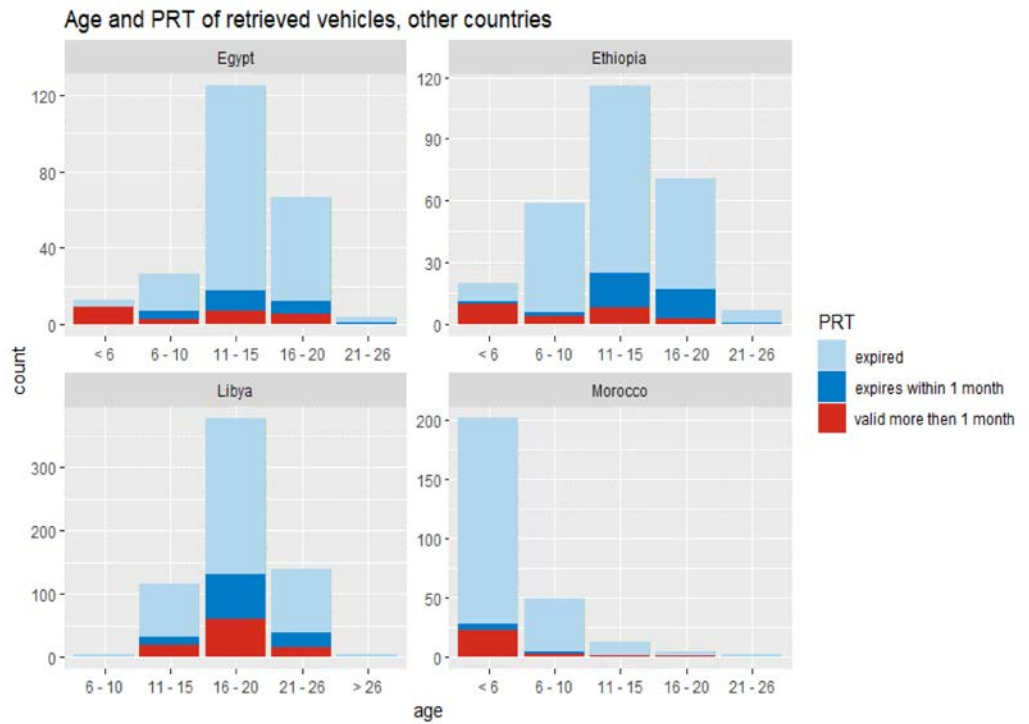


Figure 2.4. Age and PRT of retrieved vehicles to other countries in the top 12.

Data: combined Customs and RDW. ©ILT-IDlab

The extended analysis of exports to Libya demonstrates the same pattern:

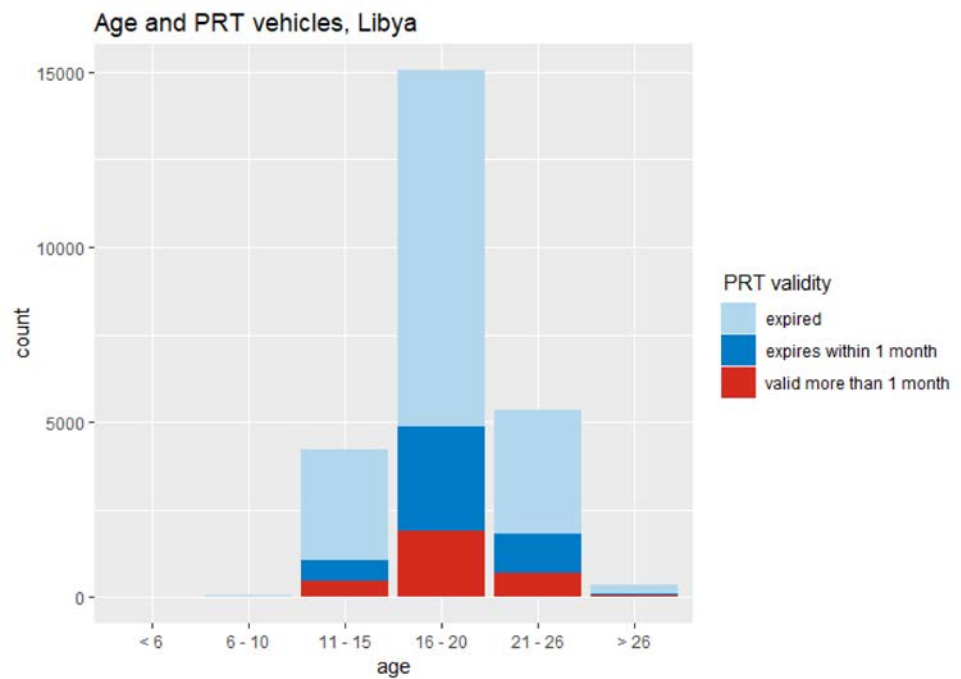


Figure 2.5. Age and PRT of vehicles to Libya. Data: RDW. ©ILT-IDlab

Age distribution and Euro emission classes

Looking at the age distribution of retrieved export vehicles, we can see that:

- The oldest LDVs, with an average age of 17-18 years, go to The Gambia, Guinea, Libya, Nigeria, and Sierra Leone. A quarter of the retrieved vehicles exported to Nigeria have an age of 19.6 years and higher.
- The young vehicles go to Morocco. Note that three-quarters of the LDVs exported to Morocco have an age of 4.9 and lower, which is in line with its age restriction of five years.
- The middle-aged vehicles of around twelve/thirteen years old go to Ghana, Ethiopia, and Egypt.

Age distribution retrieved LDV

Country	count	mean	Q1	Median	Q3
Burkina Faso	122	15.3	12.8	15.4	17.2
Côte d'Ivoire	77	14.2	12.5	14.9	17.0
Egypt	230	13.8	12.6	14.3	15.5
Ethiopia	113	12.6	9.8	13.2	15.1
Gambia	359	18.8	15.9	18.4	20.8
Ghana	987	12.4	10.2	11.7	14.2
Guinea	219	17.2	15.3	17.2	19.0
Libya	638	17.8	15.8	17.6	19.6
Mali	49	14.9	12.5	14.8	17.8
Morocco	257	4.7	3.5	4.3	4.9
Nigeria	2526	17.7	15.4	17.4	19.6
Sierra Leone	246	18.1	16.5	18.2	19.5

Age distribution retrieved HDV

Country	count	mean	Q1	Median	Q3
Burkina Faso	402	14.8	11.3	13.3	16.4
Côte d'Ivoire	165	15.7	12.4	15.9	18.3
Egypt	29	8.4	6.8	7.1	7.5
Ethiopia	178	12.0	9.4	11.3	15.3
Gambia	89	17.1	14.6	16.2	19.0
Ghana	1045	14.5	11.1	14.7	18.0
Guinea	120	17.5	14.6	17.5	20.6
Libya	30	14.3	11.4	14.4	15.6
Mali	65	16.4	13.4	15.6	17.9
Morocco	73	7.7	4.2	6.8	9.7
Nigeria	1452	18.9	15.3	18.3	22.1
Sierra Leone	130	20.0	17.0	19.1	22.6

Figures 2.6 and 2.7. Age distribution retrieved LDVs and HDVs to top 12 countries.

Data: combined Customs and RDW. ©ILT-IDlab

Comparison of the age of exported used vehicles to the current policies these countries have on imports of used vehicles (see figure 2.8) reveals that

- countries banning used imports receive them nevertheless
- countries with age restrictions import older vehicles nevertheless

We cannot exclude that some of the vehicles are further distributed to other countries. Still, the findings reveal a typical obstacle to compliance. Vehicles move between countries easily, so the patchwork of different national rules does not help get the "right" vehicles in the "right" place. Harmonisation of policies is vital. Fifteen (ECOWAS) countries in West Africa have made a start with this. The region with some 400 million inhabitants has decided to adopt one policy on importing used vehicles. These countries only want to import a minimum of Euro 4/IV emissions standard vehicles, and vehicles should not be older than five years (LDVs) and ten years (HDVs).²¹ These standards are expected to come into force January 1, 2021.

²¹ Countries have been given ten years to adhere to the age limit.

ECOWAS countries	Mean age LDV exported in 2017/2018	Mean age HDV exported in 2017/2018	Current national regulations and policies Note: ECOWAS countries have decided on new regulation for vehicles by 2021: import vehicles max 10 years, recommendation max 5 years for LDVs, minimum euro 4/IV emission standards.
BURKINA FASO	15.3	14.8	No import restrictions, no tax incentives, no euro emissions standards
CÔTE D'IVOIRE	14.2	15.7	Passenger vehicles and taxis imported < 5 years. Minicars (9-34 seats) and vans (< 5 tons) imported < 7 years. Cars (>34 seats), vans (>5 tons) imported < 10 years. Note the decree (no 2017-792) on age restriction of used import vehicles) was adopted on 6 Dec 2017 and was applied since 1 st of July 2018. (This means that the new age standard was not into force during a long period of our desk study covering export data of 2017 and 2018.)
GAMBIA	18.8	17.1	No import restrictions. No emissions standards.
GHANA	12.4	14.5	Customs Act, 2015 (Act 891) established a penalty system with graduated fees to serve as disincentive for importing LDVs and HDVs over 10 years. Taxes are based on the Customs Freight and Insurance (CFI) value. New regulations came into effect in April, 2020 (Customs Amendment Bill, 2020) as a revision to Customs Act of 2015. This law seeks to ban the import of LDV's older than 10 years. Implementation is set to commence in October, 2020.
GUINEA	17.2	17.5	No import restrictions.
MALI	14.9	16.4	Encouragement of import of new vehicles: incremental tax on age.
NIGERIA	17.7	18.9	LDVs and HDVs < 15 years, Euro 2/II emission standards.
SIERRA LEONE	18.1	20	No import restrictions. No incentive for cleaner vehicles: use vehicles pay less tax than new vehicles.
Other countries	Mean age LDV exported in 2017/2018	Mean age HDV exported in 2017/2018	Current national regulations and policies
EGYPT	13.8	8.4	Ban on import of used vehicles except electric vehicles up to an age of 3. Regulations allow for entering used cars into the country for exceptional cases (most likely returning residents), provided the Egyptian national bought it new abroad (first owner) and documentation is verified by Egypt embassy at the concerned country.
ETHIOPIA	12.6	12.0	No import restrictions. New regulation prepared to limit the age of import vehicle to 5 years
LIBYA	17.8	14.3	LDVs and HDVs < 10 years. Tax of 800-1000 LD for each car imported. Decree No 148 was implemented in May 2019. Government enforcement is difficult due to the political situation in the country. The Government of National Accord has only control in ports on the west side of the country. (This means that the new age standard was not into force in the period of our desk study covering export data of 2017/2018. However the ILT field inspections in December 2019 showed that none of the 110 passenger cars that were inspected and destined for Libya was younger than 10 years. Their average age was 18.8.)
MOROCCO	4.7	7.7	LDVs and HDVs < 5 years since 2010. Minimum Euro 4 emission standards for import vehicles since 2015.

Figure 2.8. Age of export vehicles to top 12 countries compared to current import limits.

Figure 2.8 shows that the vehicles exported from the Netherlands to eight ECOWAS countries in 2017/2018 are very different from what will be acceptable in these countries soon. The vast majority of exported vehicles are older than the upcoming age requirements and do not comply with the minimum Euro 4/IV emission standard requirements. See also the paragraph below.

Euro emission standard

Emissions regulations in the EU date back to 1970. Still, the first EU-wide standard, known as Euro 1, was not introduced until 1992. Since then, there have been a series of Euro emissions standards for different categories of vehicles. The regulations define acceptable limits for exhaust emissions of new vehicles sold in the EU. They are designed to become more stringent over time to improve air quality. Because petrol and diesel engines produce different types of emissions, they are subject to different standards. Diesel, for example, produces more particulate matter, or soot, leading to the introduction of Diesel Particulate Filters (DPFs).²² Currently, LDVs available for purchase as of September 2014 and HDVs as of January 2013 have to comply with Euro 6/VI standards.²³

²² For diesel LDVs, the introduction of particulate filters came with Euro 5 (in 2009/2010). For diesel HDVs, the introduction of particulate filters came with euro V for some trucks (2008/2009) and euro VI for all trucks (2013/2014).

²³ Standards for light-duty vehicles are designated by Arabic numerals (1-6) while those for heavy-duty vehicles are designated by Roman numerals (I-VI).

The majority of used vehicles exported from the Netherlands to top 8 West African countries have Euro standard 0, 1, 2, and 3. An exception is Ghana, which also receives a significant share of Euro 4 vehicles. This is most likely the result of a policy that allows for the import of vehicles over ten years but with penalties. These penalties serve as a disincentive for importing over-aged vehicles and apply to cars and commercial vehicles, such as buses, coaches, vans, and trucks.

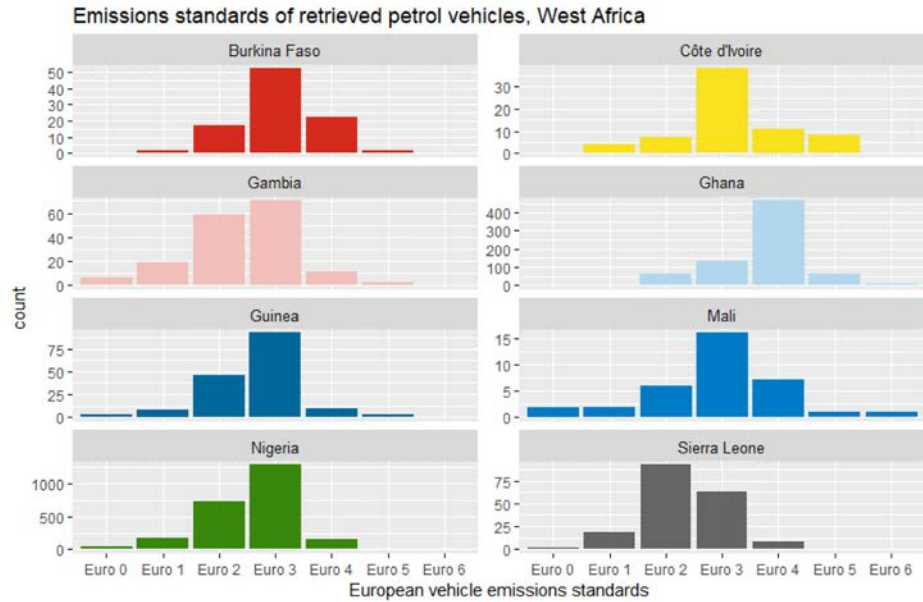


Figure 2.9. European vehicle emissions standards of retrieved petrol vehicles exported to West African countries in the top 12. Data: combined Customs and RDW. ©ILT-IDlab

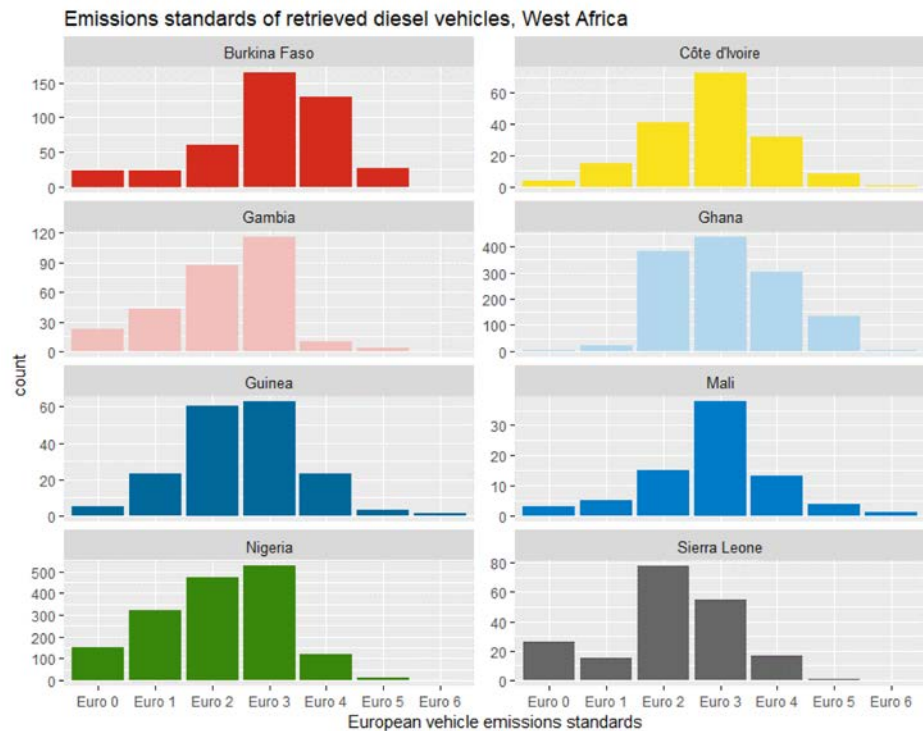


Figure 2.10. European vehicle emissions standards of retrieved diesel vehicles to West African countries in the top 12. Data: combined Customs and RDW. ©ILT-IDlab

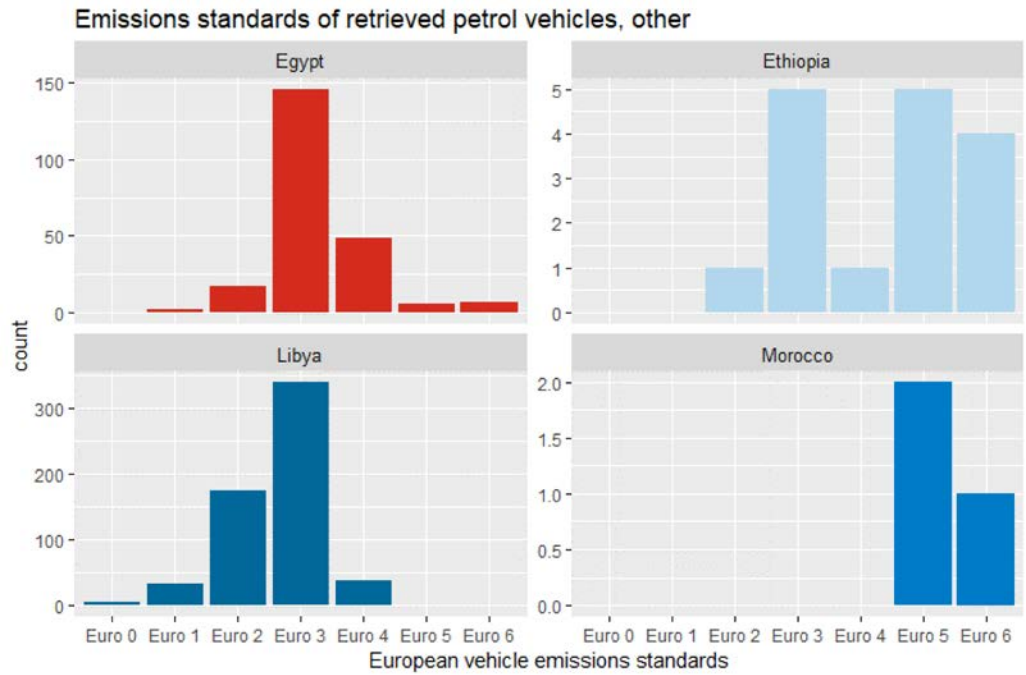


Figure 2.11. European vehicle emissions standards of retrieved petrol vehicles exported to other countries in the top 12. Data: combined Customs and RDW. ©ILT-IDlab

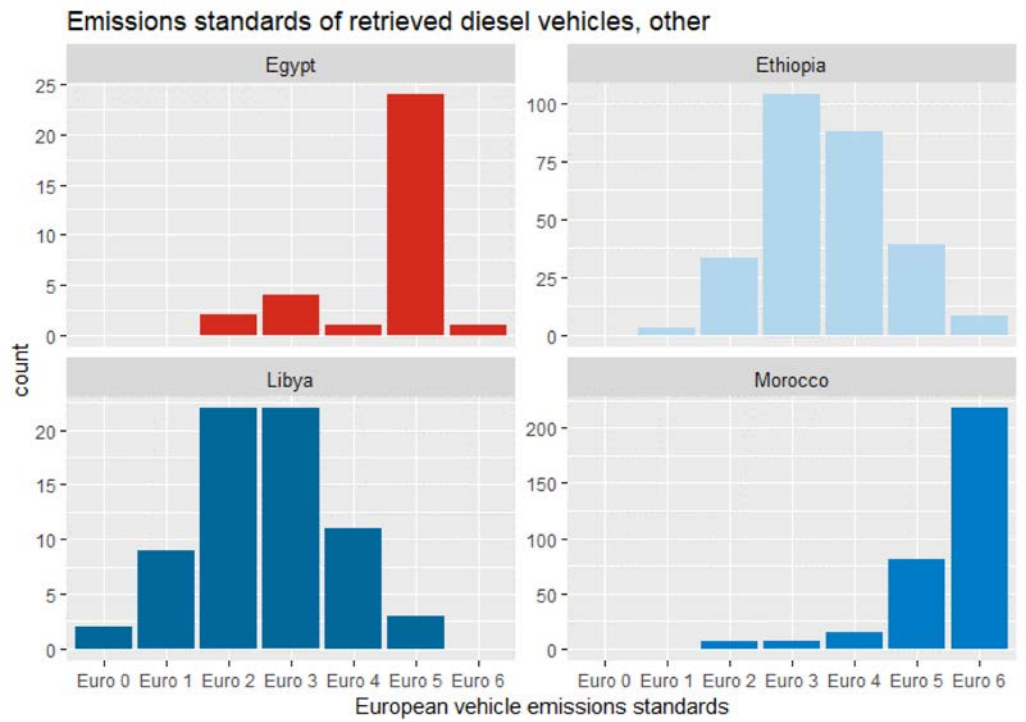


Figure 2.12. European vehicle emissions standards of retrieved diesel vehicles exported to other countries in the top 12. Data: combined Customs and RDW. ©ILT-IDlab

The (extended) analysis of exports to Libya demonstrates the same pattern. Most vehicles exported to Libya are below Euro 4.

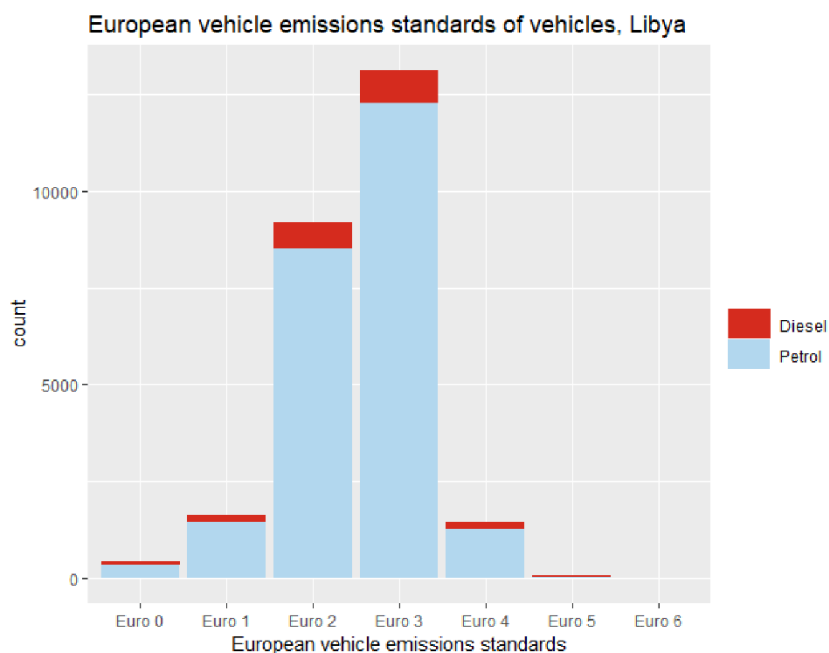


Figure 2.13. European vehicle emissions standards of vehicles to Libya.
Data: RDW. ©ILT-IDlab

Price per kilo

Price is one of the main driving forces of the used vehicle trade. And, usually, the lower the price, the older the vehicle and the higher degree of wear and tear. Other factors influencing the price are preferences for a particular type of vehicle and brand, mileage, and market regulations. For example, the banning of diesel vehicles in many European cities will push these vehicles to the export market for developing countries at lower prices than one would expect based on age and technical state of the vehicles alone.

Information from the customs database provides us with a representative picture of prices of export vehicles (to all African countries). We have calculated the price in euro per net kilo.

Figure 2.14 shows that:

- the peak is around values of 40 - 70 Eurocents per kilo
- most LDVs are exported under a price of 1 Euro per kilo, commonly between 40 and 70 Eurocents/kg.
- there is a very small market for higher-priced LDVs.
- the same pattern applies to HVDs, although the figure shows more often higher-priced vehicles compared to LDVs.

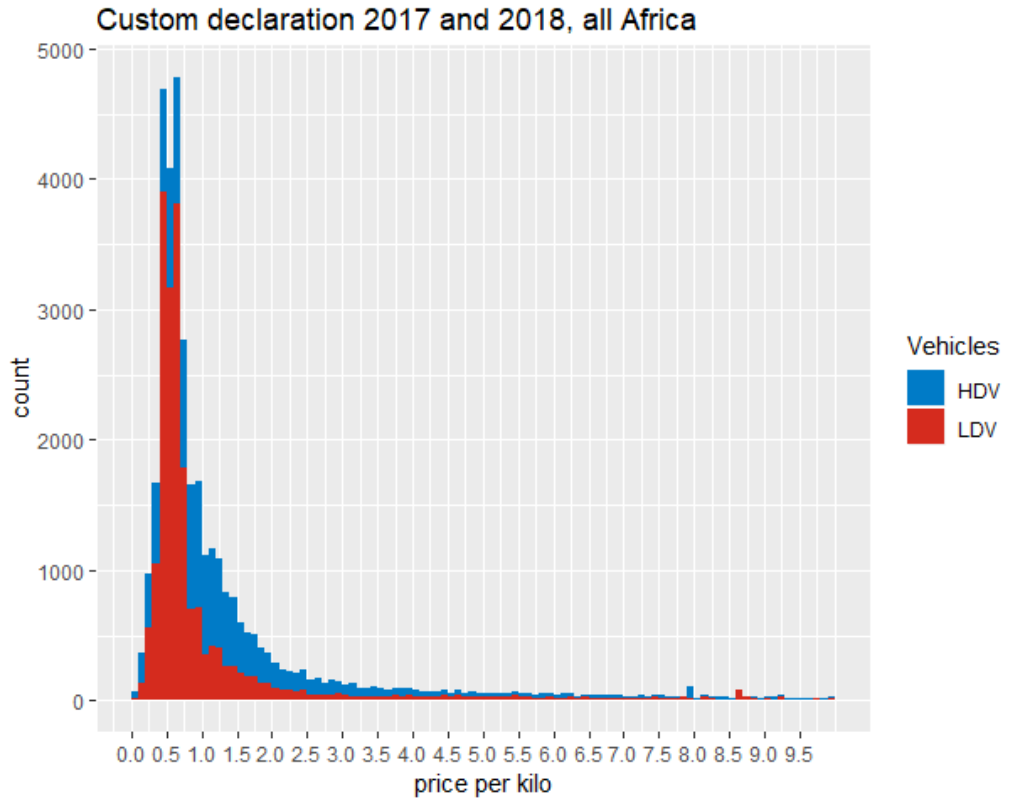


Figure 2.14. Distribution of price per kilo of export vehicles to all African countries. Data: Customs. ©ILT-IDlab

The price range of LDVs and HDVs exported from the Netherlands going to West and North Africa are among the lowest compared to other important destination regions, like the Ukraine region or the Middle East.

Exported LDV, Price per kilo					Exported HDV, Price per kilo				
Region	count	Q1	Median	Q3	Region	count	Q1	Median	Q3
Central Europe	48593	0.74	1.17	1.96	Western Africa	12324	0.64	0.99	1.5
Northern Africa	12084	0.50	0.59	0.68	Ukraine region	7513	1.65	2.72	3.7
Ukraine region	10499	3.23	3.98	4.75	Central Europe	4600	0.84	1.49	2.5
Western Europe	9528	8.70	14.29	19.43	Middle East	4408	1.84	4.66	8.4
Western Africa	9229	0.58	0.91	1.55	Western Europe	3649	3.67	9.79	12.1
Russia region	4916	0.45	0.83	1.06	Rest of South America	2747	0.78	1.20	2.1
Middle East	3898	6.26	7.68	12.80	Russia region	2221	0.94	1.65	6.4
Rest of South America	727	0.63	1.49	8.05	Northern Africa	1064	0.78	2.36	4.1

Figures 2.15 and 2.16. Price per kilo of export Light and Heavy Duty Vehicles to different regions of destination. Data: Customs. ©ILT-IDlab

Looking at the LDVs per country, we notice that Libya and Nigeria import vehicles from the lower end of the price range. A quarter of the vehicles going to these top 2 destination countries in 2017/2018 have a price below 50 Eurocents per kilo.²⁴ In addition, we see that the high-price vehicles mostly go to Morocco.²⁵

We observe that the top 3 destination countries of the exported HDVs are in West Africa and that a quarter has a price of 89 Eurocents and lower price per kilo.²⁶ This corresponds with the fact that the prices of exported HDVs from the Netherlands going to Western Africa are the lowest compared to other important destination regions. The higher-price HDVs mostly go to Egypt, Ethiopia, and Morocco.

Exported LDV, Price per kilo					Exported HDV, Price per kilo				
Country	count	Q1	Median	Q3	Country	count	Q1	Median	Q3
Libya	10470	0.50	0.57	0.65	Nigeria	4801	0.53	0.79	1.1
Nigeria	3863	0.50	0.68	1.04	Ghana	2250	0.89	1.34	2.0
Ghana	1460	0.89	1.25	2.08	Burkina Faso	1041	0.70	1.05	1.4
Morocco	678	4.80	6.24	8.59	Ethiopia	838	2.14	3.48	5.0
Gambia	577	0.59	0.83	1.32	Côte d'Ivoire	743	0.77	1.07	1.6
Sierra Leone	462	0.54	0.80	1.24	Guinea	521	0.49	0.79	1.2
Guinea	449	0.57	0.92	1.60	Sierra Leone	465	0.66	1.00	1.6
Egypt	430	0.89	1.92	27.40	Mali	445	0.94	1.42	1.9
Ethiopia	230	2.05	3.51	6.35	Egypt	307	1.73	2.53	4.2
Burkina Faso	216	0.68	1.16	2.78	Libya	272	0.35	0.40	0.6
Côte d'Ivoire	186	0.95	1.70	6.81	Morocco	247	1.41	2.77	4.6
Mali	186	0.71	1.61	3.20	Gambia	203	0.67	1.02	1.5

Figure 2.17. Price per kilo of export vehicles to top 12 countries. Data: Customs. ©ILT-IDlab

²⁴ Examples of low-price LDVs going to *Nigeria* are:

- a Volkswagen Polo from 1996, with a weight of 885 kilos and a price of 250 Euros (28 Eurocents/kilo) - a Peugeot 206 from 2000 with a weight of 1039 kilos for a price of 500 Euros (48 Eurocents/kilo) - a Toyota Starlet from 2004, with a weight of 887 kilos for a price of 400 Euros (45 Eurocents/kilo)

Examples of low-price LDVs going to *Libya* are:

- a Mercedes-Benz A160 from 1998, with a weight of 1500 kilos and a price of 400 Euros (27 eurocents/kilo) - a Mazda 323 from 2000, with a weight of 1500 kilos and a price of 375 Euros (25 Eurocents/kilo) - a Chevrolet Tacuma from 2005, with a weight of 1475 kilos and a price of 450 Euros (31 Eurocents/kilo)

²⁵ Examples of high-price LDVs going to *Morocco* are:

- an Audi Q5 from 2009, with a weight of 1805 kilos for a price of 9,800 Euros (5.4 Euros/kilo) - a Skoda Octavia from 2014, with a weight of 1220 kilos for a price of 9,500 Euros (7.8 Euros per kilo) - a Volkswagen Jetta from 2014, with a weight of 1395 kilos for a price of 11,137 Euros (8 Euros per kilo)

²⁶ Examples of low-price used HDVs exported to African countries are:

- a Mercedes-Benz 1622 truck from 1994, with a weight of 7,500 kilos and a price of 2,950 (39 Eurocents/kilo) - a DAF truck from 1996, with a weight of 6,720 kilos, exported for a price of 8,300 Euros to Ghana (1.24 Euro/kilo) - a Scania truck from 1997, with a weight of 12,825 kilos, exported for a price of 18,300 Euros to The Gambia (1.43 Euros/kilo) - a Renault Truckhead Premium 400 from 1999, with a weight of 6,430 kilos and a price of 6000 Euros (93 Eurocents/kilo) to Côte D'Ivoire - a DAF truck AE65CC from 2002 with a weight of 11,180 kilos and a price of 7,250 Euros (65 Eurocents/kilo) to Burkina Faso.

Mileage

Figure 2.18 shows the distribution of mileage of the matched/retrieved used export vehicles to the different top destination countries. The figures show that:

- The majority of exported vehicles to the top destinations in Africa have a mileage of over 200,000 km.
- HDVs have higher mileage than LDVs. A quarter of the HDVs exported to Ghana, Nigeria, The Gambia, Burkina Faso, Morocco, Guinea, Côte D'Ivoire, and Mali have a mileage of over 300,000 km.
- The LDV vehicles with high mileage go to Nigeria, The Gambia, Sierra Leone, and Burkina Faso. In contrast, the vehicles with relatively lower mileage (a peak of just below/around 200,000 km) go to Morocco, Ghana, and Ethiopia.

LDV mileage (km x 1000) retrieved vehicles

Country	count	Mean	Q1	Median	Q3
Nigeria	2508	250	199	241	286
Ghana	984	207	148	193	240
Libya	633	220	163	205	245
Gambia	358	270	208	262	317
Sierra Leone	244	245	185	229	283
Egypt	229	209	168	204	238
Guinea	217	247	193	234	294
Morocco	210	208	166	194	232
Burkina Faso	121	247	191	236	303
Ethiopia	113	202	133	188	261
Côte d'Ivoire	76	230	182	218	264
Mali	49	228	189	220	275

HDV mileage (x 1000) retrieved vehicles

Country	count	Mean	Q1	Median	Q3
Ghana	802	257	172	231	303
Nigeria	600	274	196	253	321
Ethiopia	169	219	147	201	283
Sierra Leone	78	234	163	230	293
Gambia	67	286	186	233	308
Burkina Faso	60	303	219	274	357
Morocco	52	317	223	295	388
Guinea	41	306	204	273	334
Côte d'Ivoire	31	277	208	279	333
Mali	17	306	242	301	366
Libya	7	252	208	245	278

Figure 2.18. Mileage of retrieved vehicles to top 12 countries. Data: combined Customs and RDW. ©ILT-IDlab

It is worth noting that for a part of the export vehicles, the real mileage could be much higher. Their reported mileage has a judgement that is "illogical", "no judgement" or it is missing in the Dutch vehicle register.²⁷

These vehicles run the risk that the odometer has been manipulated. If the odometer of a second-hand vehicle is reversed, the buyer is seriously disadvantaged. It also has a negative impact on road safety. Not only does the buyer pay too much for the vehicle; one will also incur higher maintenance costs. Necessary maintenance is usually linked to mileage.

²⁷ Mileage is considered "logical" if the series of mileage readings is increasing. It is considered "illogical" if the series of mileage readings is not increasing. It is possible that the counter has been reversed. The Netherlands Vehicle Authority (RDW) only bases the 'illogical' judgment on measurements after January 1, 2014. A vehicle may receive "no judgement" if not enough information is available. <https://www.rdw.nl/particulier/voertuigen/auto/tellerstanden/toelichtingen-op-oordelen>

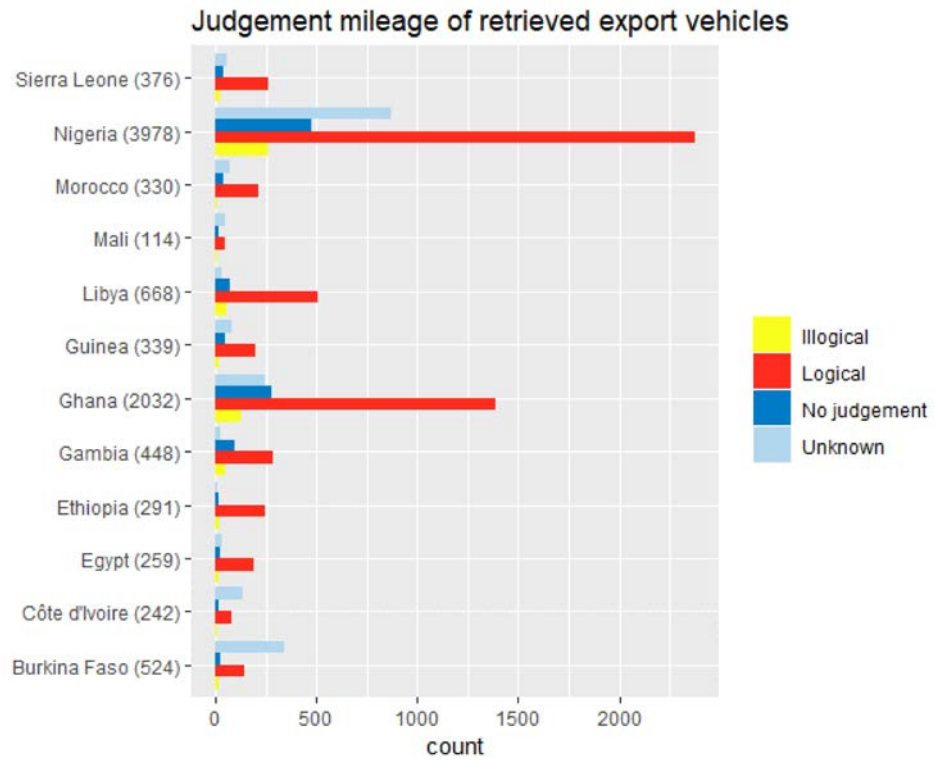
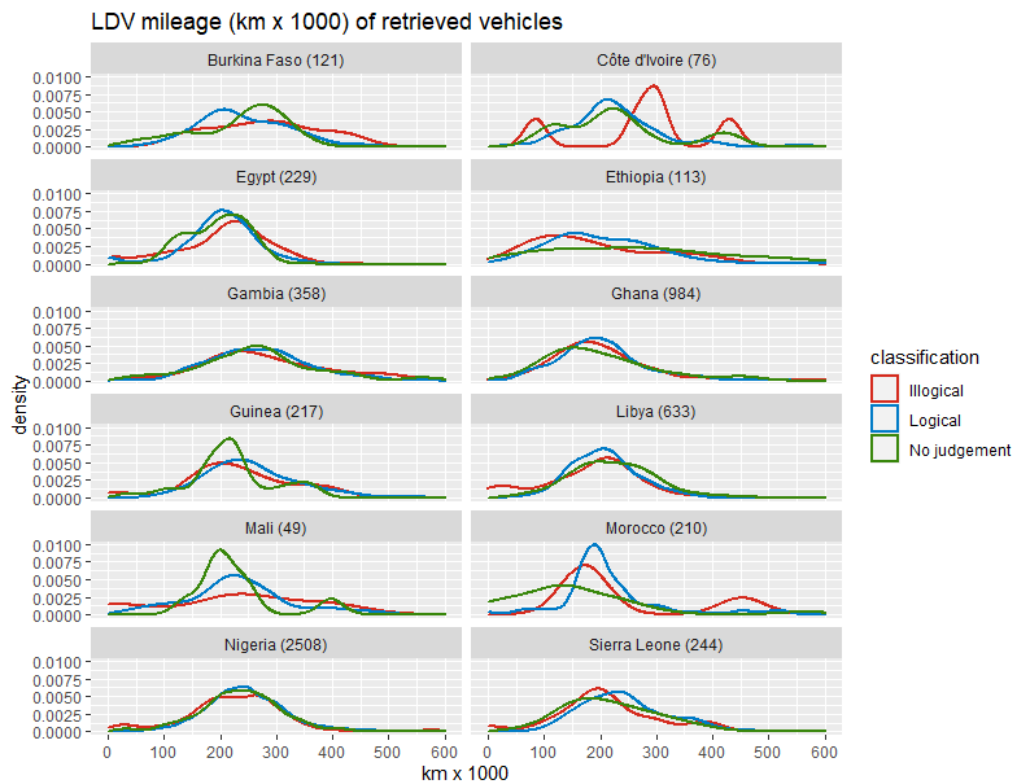
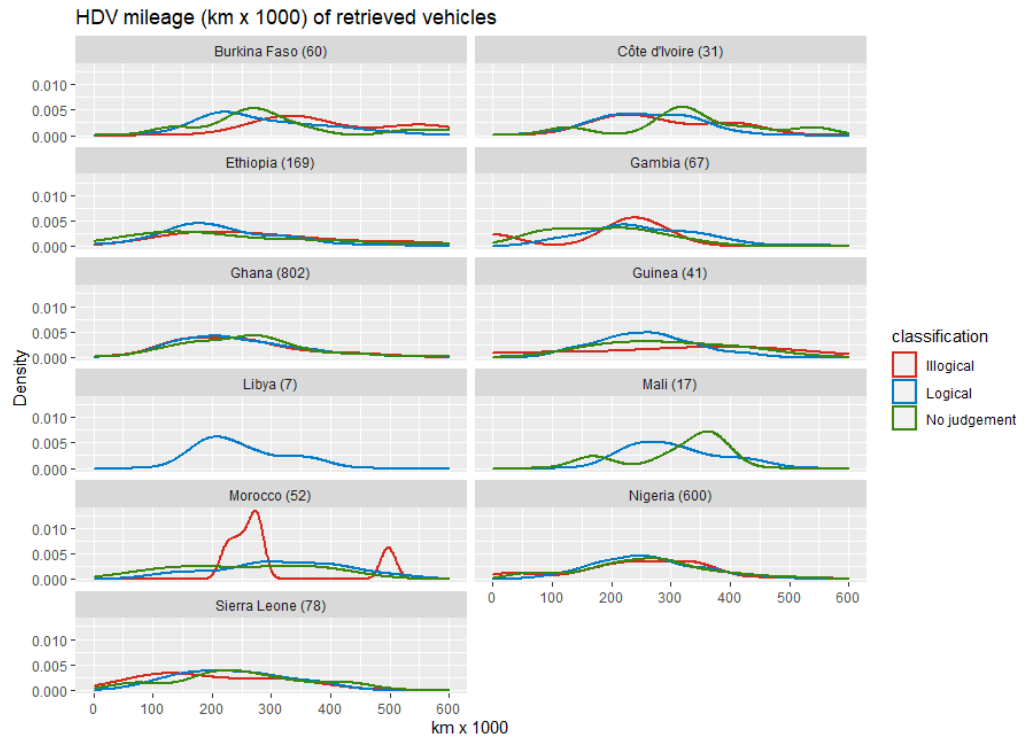


Figure 2.19. Mileage of retrieved vehicles to top 12 countries per judgement type. Data: combined Customs and RDW. ©ILT-IDlab

Figures 2.20 and 2.21 show the relative distribution of mileage. The most common mileage for Nigeria, Guinea, and The Gambia is around 250,000 km, and for Ghana, it is around 200,000 km.





Figures 2.20 and 2.21. Relative distribution of mileage of retrieved Light Duty Vehicles to top 12 countries. Data: combined Customs and RDW. ©ILT-IDlab

The extended analysis on Libya shows a small peak for illogical mileage below 50,000 km and a high peak (for all classifications) around 220,000 km.

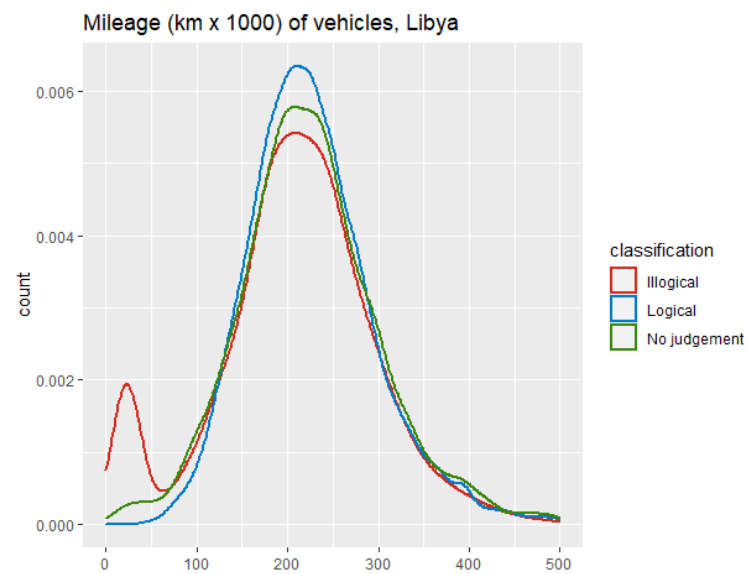


Figure 2.22. Relative distribution of mileage of export Light Duty Vehicles to top 12 countries. Data RDW. ©ILT-IDlab

2.4 Export to West Africa compared with dismantling in the Netherlands

We have compared the LDVs dismantled in the Netherlands in 2017/2018 (included in the RDW register) with LDVs exported to the West African countries in our top 12 in 2017/2018. The following images show that the groups of vehicles are very much alike with some slight differences.

For both groups, the peak is on vehicles aged between sixteen and twenty years.²⁸

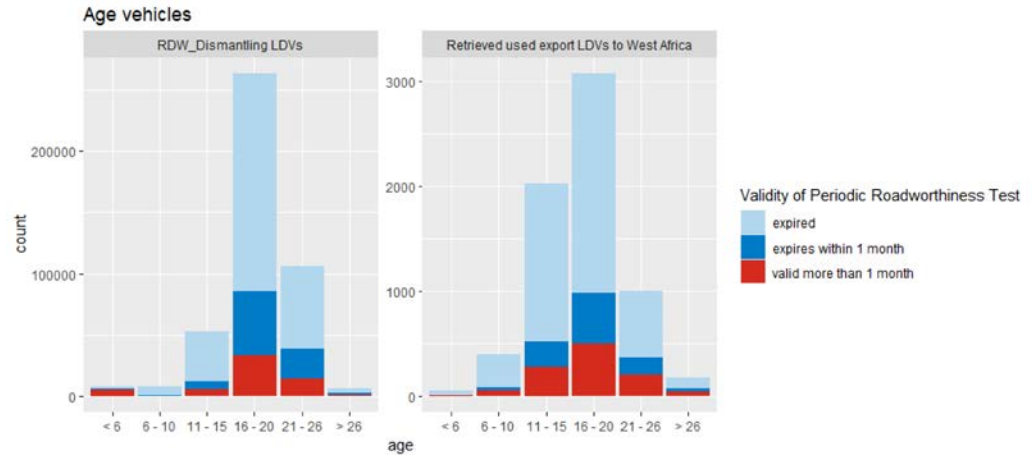


Figure 2.23. Age of dismantled versus retrieved vehicles exported to West Africa. Data: RDW and combined Customs and RDW. ©ILT-IDlab

For dismantled vehicles, the peak is especially on Euro 2 and Euro 3. For export vehicles to West Africa, the peak is especially on Euro 3 and high for Euro 2.

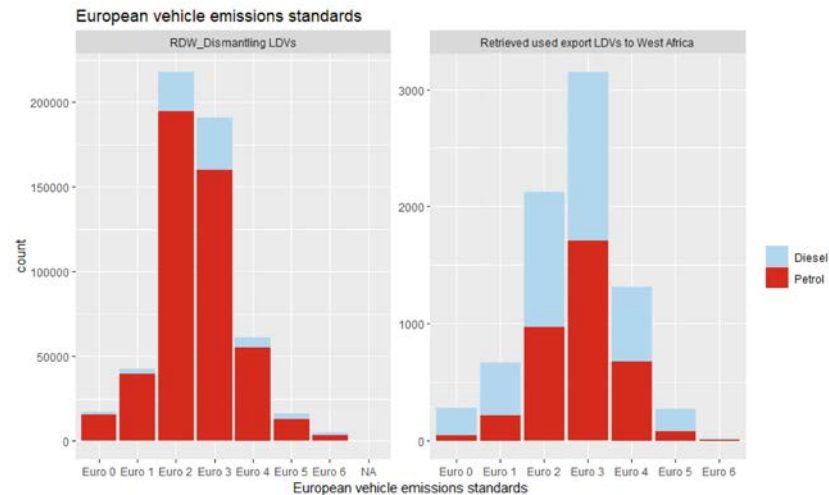


Figure 2.24. European emissions standards of dismantled versus retrieved vehicles exported to West Africa. Data: RDW and combined Customs and RDW. ©ILT-IDlab

The peak in mileage is around 200,000 km, with export vehicles to West Africa even a bit higher.

²⁸ The average age of an ELV recycled in the Netherlands is just over 18 years in 2017 and 2018: 18.2 years in 2017 and 18.1/18.4 in 2018. <https://arn.nl/levensduur-auto-met-2-jaar-gestegen/> <https://www.clo.nl/indicatoren/nl0135-aantal-voertuigwrakken>

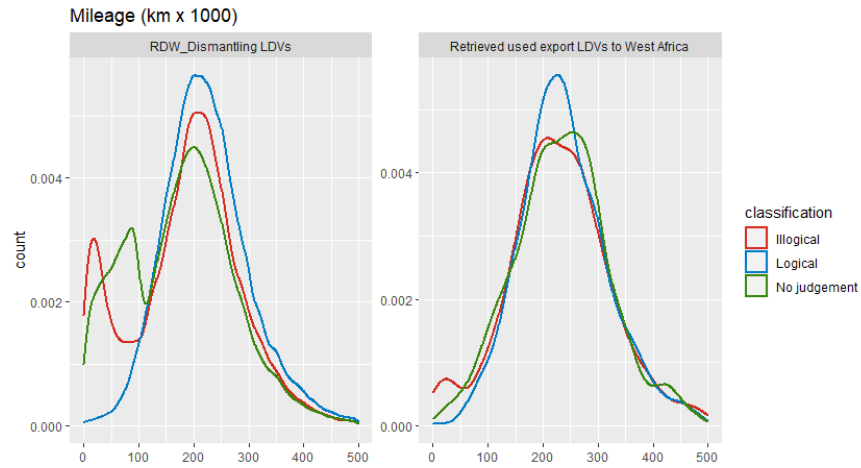


Figure 2.25. Relative distribution of mileage of dismantled versus retrieved vehicles exported to West Africa Data: RDW and combined Customs and RDW. ©ILT-IDlab

2.5 Indication of leakage flows

“Fictitious dismantling”

We have identified sixty-three vehicles (mostly to Nigeria) out of 9,800 used vehicles that have been exported to top 12 African countries in 2017/2018 even though they have been deregistered from the Dutch vehicle register for dismantling/scrappage. This number must be higher as we only did this exercise with vehicles where we found a match between the databases of customs and the RDW. This finding of “fictitious dismantling” suggests that several end-of-life vehicles may have been exported in violation with the EU Waste Shipment Regulation.

Export of stolen vehicles

A comparison of the list of Dutch-registered vehicles stolen between 2010 and 2019²⁹ to the Customs export data of 2017 and 2018 by the VIN, shows that at least seven stolen vehicles have been exported to African countries. See figure 2.26.

Type and brand	Year of theft	Age at the moment of theft	Year and destination of export
Passenger car, petrol: VOLKSWAGEN GOLF	2018	4	2017, Egypt
Passenger car, petrol: MERCEDES-BENZ GLA 250	2018	5	2018, Ghana
Passenger car, diesel: VOLKSWAGEN POLO	2018	1	2018, Ghana
Passenger car, diesel: VOLVO V40	2018	6	2018, Ghana
Passenger car, diesel: DACIA Sandero	2018	4	2018, Ghana
Passenger car, diesel: MERCEDES BENZ	2018	20	2018, Guinea
Passenger car, petrol: TOYOTA Starlet 1.3 U9	2018	17	2018, Nigeria

Figure 2.26. Examples of stolen vehicles exported to Africa in 2017 and 2018. Data: combined Customs and LIV.

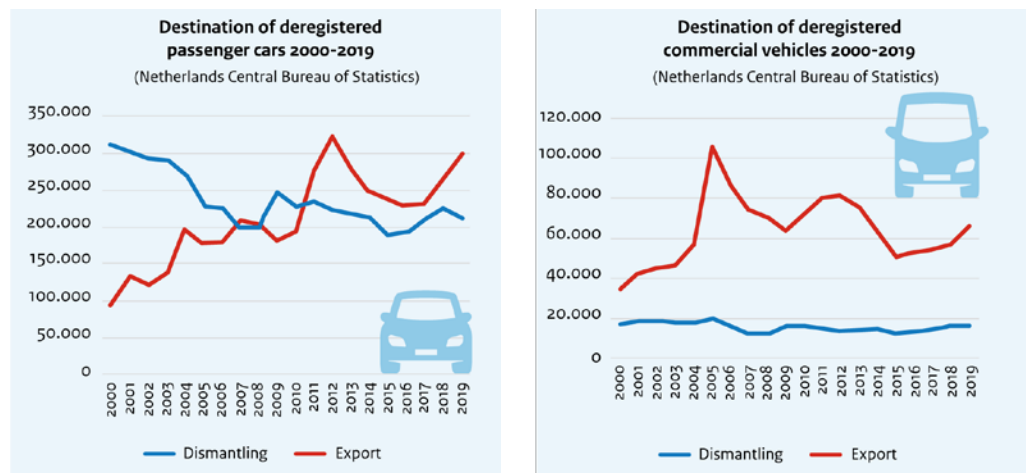
²⁹ This list comes from the National Vehicle Crime Information Centre (Dutch: LIV).

We assume the number of stolen vehicles exported to African countries to be higher because:

- customs export declaration does not require the VIN. We could only compare it for exported vehicles for which the customs export data provided a VIN.
- we only compared it to Dutch stolen vehicles while an estimated share of around 40% of the export vehicles from the Netherlands concern vehicles with foreign registries.

Trends in export and dismantling

There is a lively cross-border trade in vehicles. Vehicle exports from the Netherlands have significantly increased in the last two decades. To some extent, the improved quality of vehicles explains this. Passenger vehicle exports reach nearly 300,000 in 2019. At the same time, the dismantling of these vehicles in the Netherlands has decreased. In 2000, the number of passenger cars dismantled is 310,323, while in 2019, the number is decreased by almost 100,000 to 213,530. See figure 2.27. The dismantling of commercial vehicles occurs fairly regularly between 2000 and 2019: around 16,000 per year. See figure 2.28.



Figures 2.27 and 2.28. Trends in export and dismantling passenger cars / commercial vehicles since 2000.
©ILT

The flow of export vehicles has not only grown since 2000 but also aged. In 2000, only seven per cent of the export flow of passenger vehicles consists of vehicles aged sixteen years and older. This is the age at which vehicles usually approach the end of their lifespan. It is noteworthy that in 2019, nearly 30 per cent of the export flow of passenger vehicle vehicles consists of vehicles aged sixteen years and older: 87,507.³⁰ These old vehicles are traded as goods.

We compare the number of end-of-life vehicles dismantled in the Netherlands annually to the total number of registries of newly bought vehicles about eighteen years ago. After all, the average age of an end-of-life vehicle is just over 18 years in the last few years. We note that the share is only 31-36%. See the flow diagram in figure 2.29.

³⁰ Source: CBS StatLine

This means that only one out of three ends up in a recycling company in the Netherlands to be dismantled under controlled conditions and with a high rate of reuse of materials.³¹ Consequently, two out of three do not, even though a recycling fee has been paid for all of them. This fee is intended for responsible dismantling at the end of the service life.

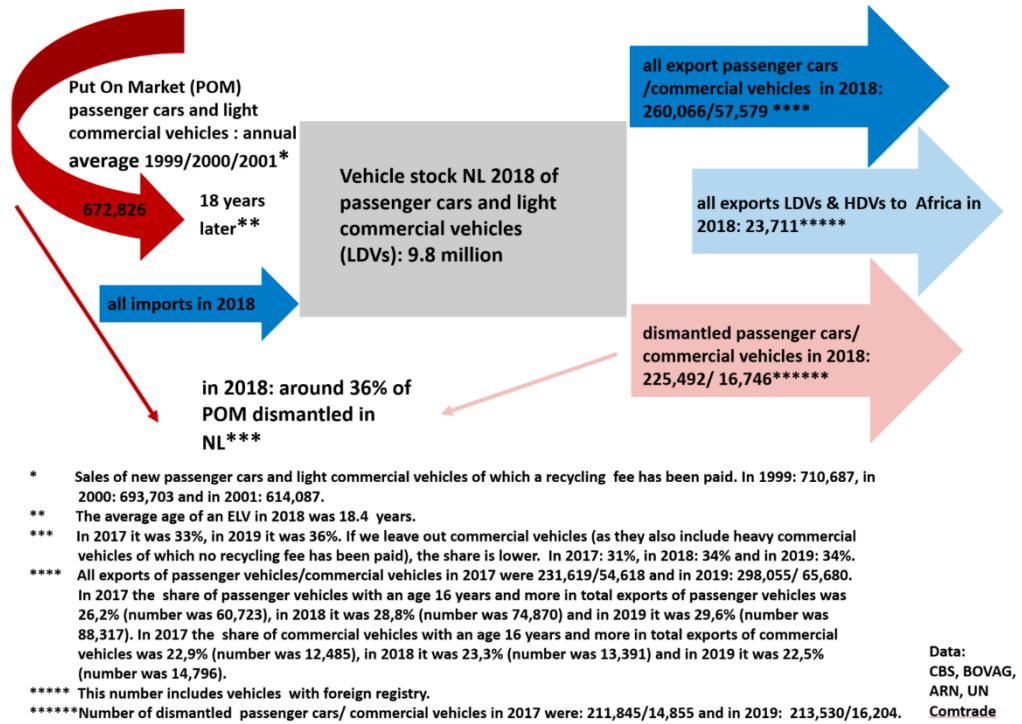


Figure 2.29. Dismantling rate of vehicles in 2017, 2018, and 2019. ©ILT

³¹ "Business owners and partners in the car recycling sector, led by ARN, have succeeded in reusing no less than 98.4 per cent of the weight of end-of-life vehicles. It must be said, this is an amazing achievement. In 2018, the car recycling industry responsibly processed 216 million kilos of materials from 207,239 cars." <https://arn.nl/en/98-4-of-every-scrap-car-gets-a-useful-destination/>

3 Findings of the field inspections

3.1 Our approach

During three consecutive days in December in 2019, the ILT performs field inspections in the port of Amsterdam. Per our request, experts of the Netherlands Vehicle Authority (RDW) participate. Together, we inspect 160 vehicles.



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Our joint inspection takes place at a terminal where vehicles are collected before loading them onto vehicle ships and RoRo carriers with Africa as their destination. For each vehicle, we register standardised information aimed to control:

- the functioning of the emission control devices
- the technical state of the vehicles
- the identification of the vehicle

A few remarks:

- At the moment of inspection, only a small number of vehicles destined for West Africa is present at the terminal. Days before the inspection, the RoRo carrier "Grande Dakar" has already loaded vehicles for West Africa. As a result, we depend on what enters the premises during the inspection. We focus on testing the vehicles arriving. As the rumour of our presence spreads quickly, we notice that fewer vehicles come in on the inspection days. This can have a flattening effect on our results. For instance, the majority of the vehicles inspected might have been of better quality, while vehicles of lesser quality might have queued outside the terminal premises or been brought to another port.



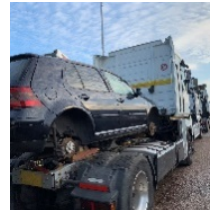
Cars that queued outside the premises © ILT December 2019

- We also inspect vehicles already in queues on the terminal premises. The vehicles have to be physically present and able to drive as that is the only way for us to check the technical state, the electronic systems, and the functioning of the emissions devices. We cannot or only superficially inspect around 50% of the hundreds of vehicles present at the terminal because the battery is empty or the engine does not work.



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- Also, many vehicles are “sandwiched” between other vehicles. Because of that, we cannot retrieve them from the queue. Some of them are even stacked on other vehicles.



- Furthermore, we can only superficially inspect vehicles that are utterly worn out, are too dirty to enter, have empty batteries, or of which the doors are closed. This concerns about a fifth of the one hundred and sixty vehicles inspected.



A Volkswagen from 1985 with doors that could not open, destined for Nigeria © ILT December 2019

- We do not inspect the drivable vehicles as thoroughly as what happens during a Periodic Roadworthiness Test. Many items to be verified for the Periodic Roadworthiness Test require the vehicle to be over a pit or on a lift.

Examples of these are axles, wheel bearings, steering gear condition, chassis, fuel tanks and pipes, and the floor.³² A pit or a lift is not available.

- Tracing the VIN is essential in identifying the vehicle in the Dutch vehicle register. If it is a foreign vehicle, we aim to identify it in the European car and driving license information system EUCARIS³³. We have not been able to identify all one hundred and sixty vehicles.



Despite these limitations and the sample group being relatively small, we believe we have a good impression and indication of the physical state of used export vehicles to North and West Africa. We also believe that the outcome of the 160 inspected vehicles might be more favorable compared to the total exports for the reasons described earlier.

Our field inspections confirm the outcomes of our desk study. In sum, the vehicles exported are predominantly old (average age is 18.2), below Euro 4/IV emission standard (85%), and with a typical mileage of over 200,000 km (average is 225,689 km).

3.2 Overview of 160 inspected vehicles

General

- The majority runs on petrol. We test one hundred twenty-two petrol and thirty-eight diesel vehicles.
- The majority of the group are passenger cars: one hundred and twenty-seven. There are fifteen light vehicles for the carriage of goods and people, like vans or pickups. Eighteen vehicles are heavy carriers of goods like trucks.
- A share of 61% is Dutch-registered vehicles.³⁴
- A share of 34% has a valid roadworthiness certificate. Of 4%, the validity will expire within a month, of 19%, it already has expired, and of 43%, it is unknown/unclear.
- The average age of all vehicles tested is 18.2. The average age of petrol vehicles is 18.5, and of diesel vehicles, it is 17.2.
- The majority has Libya as destination: one hundred and ten (ninety to Benghazi, twenty to Al Khoms). Twenty-six vehicles are going to Nigeria

³² DIRECTIVE 2014/45/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC.

³³ EUCARIS is a cooperation between national vehicle registration authorities of several European countries. It is started in 1994 to fight international vehicle crime. Since the development of the EUCARIS system, the number of countries using the EUCARIS technology and the number of services offered has been growing constantly. Through EUCARIS, we have been able to identify vehicles registered in one of the following fifteen countries: Belgium, Cyprus, Estonia, France, Germany, Italy, Hungary, Latvia, Lithuania, Luxembourg, Norway, Romania, Slovakia, Sweden, and the UK.

³⁴ A group of 30% is German and 3% are Polish. The remaining part comes from other countries, like Belgium, France, Hungary, Spain or they could not be traced back.

(Lagos) and twenty to Ghana (Tema).³⁵



- During our inspection, we record the mileage indicated on the odometer. The average mileage of all vehicles tested is 225,689. The average mileage of petrol vehicles is 193,188, and of diesel vehicles, it is 356,898. The real average mileage must be higher as these also include the mileages of which the judgement is “no judgement”, “not registered,” and “illogical”.

Emission standards

- Of the diesel and petrol vehicles, a share of 85% has a Euro 0, 1/I, 2/II, or 3/III emission standard. Only 15% has Euro 4/IV emission standard or above. This is in line with the findings from the desk study.

Brands

- Petrol cars consist of eighteen different brands. The five most prominent brands are Hyundai, Opel, Nissan, Toyota, and Mercedes.
- Diesel LDVs and HDVs are from sixteen different brands. The five most prominent brands are Mercedes, Volkswagen, Man, Iveco, and Hyundai.

In the following paragraphs, we will describe the method and results of

- the emission performance of petrol and diesel vehicles.
- state of the vehicles and mileage.
- identification of the vehicles.

³⁵ The remaining four go to Senegal, Benin, Togo, and Burkina Faso (through Tema).

3.3 Emissions petrol vehicles

Euro emissions standards

Polluting emissions from petrol vehicles have decreased over the last decades since the introduction of the Euro 1 emission standard in Europe in 1992. Catalytic converters have become compulsory for new cars in 1993. The maximum limits for exhaust emissions of new vehicles sold in the EU have become more stringent with each new Euro emission standard coming into force.³⁶ E.g., a Euro 5 vehicle, introduced in 2009, is to have less polluting emissions compared to a Euro 2 vehicle introduced in 1996. Limits are set for carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx), and since Euro 5, there are also limits on Particulate Matter (PM). Euro 6 introduces the Particulate Number (PN).

Our approach

During our field inspection, we use the standard Dutch methodology to check the emission performance of petrol cars in the context of the periodic roadworthiness test. The inspection method focuses on testing the CO level and the lambda value.³⁷ This indicates the correct functioning of the engine and the emission control system (catalytic converter and lambda probe). A correct value will only be measured if the engine and the emission control system are functioning properly. If one removes the catalytic converter, one will affect the measured values. This results in a non-compliance with the required emission standard.

The steps we follow are:

- A reading of on-board diagnostics (OBD) to see if it indicates malfunctions of the emission control system³⁸.
- A check of the malfunction indicator lamp (MIL) on the dashboard³⁹.
A measurement using an exhaust gas analyser ("4-gas meting"). The proper functioning of the catalytic converter and lambda probe is assessed based on the carbon monoxide content of the exhaust gases and a calculated air-fuel ratio (expressed as the Lambda-coefficient). The CO emission should not exceed specified limits according to the date of the first registration.⁴⁰ A Lambda coefficient, measured at high idle, outside the range 1 ± 0.03 indicates that the catalytic converter or the lambda probe is not functioning properly.

³⁶ Euro 1: July **1992**, Euro 2 January **1996**, Euro 3, January **2000**, Euro 4: January **2005**, Euro 5: Sept **2009** and Euro 6: Sept **2014**. The standards refer to new type approvals. A second date is specified for one year later, unless indicated otherwise, which applies to the first registration (entry into service) of existing, previously type-approved vehicle models.

³⁷ Lambda represents the combustion efficiency of an engine in terms of air/fuel ratio in the exhaust gases.

³⁸ OBD means on-board diagnostics. It is a standardized system allowing external electronics to interface with a car's computer system. Passenger cars and commercial vehicles below 3.5 ton that enter the market after 2006 have an OBD. When a car's sensor observes that something is wrong, it triggers a message known as a "trouble code". OBD scanners can check these trouble codes to determine what is wrong, and clear them from the computer's memory once the problem is fixed. Trouble codes start with a letter and include four or five numbers, which together point to the specific subsystem and what problem it is experiencing. Codes manifest, for example, as a "check engine" light or another warning on the dashboard.

³⁹ This light indicates an emission-related malfunction. It may be that the catalytic converter is not working or is in need of replacement, but it can also be something else. At the same time, if the light is not on, it does not exclude a problem with the catalytic converter. The software may have been amended to turn off the light.

⁴⁰ In general, for older cars (below euro 3), the level of CO emitted by stationary vehicle should be max 0.5% vol and by high idle (touring) vehicle max 0.3% vol. Newer cars (in the Netherlands with a date of entry as of July 1, 2002) should have max 0.3 % vol by stationary vehicle and 0.2 % vol by high idle.



Inspection of a ten-year-old Euro 4 Hyundai for Ghana with functioning catalytic converter

- As leaks in the exhaust pipes affect the emission measurements, we also visually check the exhaust pipes. Too many leaks could distort the test by measuring too much oxygen. If this happens, a non-compliance result does not prove there is a problem with the emission control system. In most cases, and if the measurement was negative, we check the physical presence of the catalytic converter.

Our findings

No petrol passenger car inspected carries a Euro 5 or a Euro 6 emission standard. A share of 93% has a Euro 0, 1, 2, or 3 emission standard. The biggest group has a Euro 3 standard (45%). Only 7% has a Euro 4 standard.

The physical testing of eighty-eight petrol passenger cars shows that:

- Seventy cars (80%) comply with the test, indicating a functioning emission control system.
- Twelve cars (14%) have an emission problem due to
 - removed catalytic converters (9)⁴¹.
 - non-performing catalytic converters (3).
- Six cars (7%) have a potential emission problem because:
 - the OBD or the malfunction indicator lamp (MIL) indicates a problem with the emissions or that a problem can be expected soon.
 - the vehicle has a leaking exhaust pipe; consequently, the non-complying test result is unreliable. A leaking exhaust is a non-conformity with the requirements for the periodic roadworthiness test and will not have the vehicle passed for the test (exhaust has to be renewed/repaired).

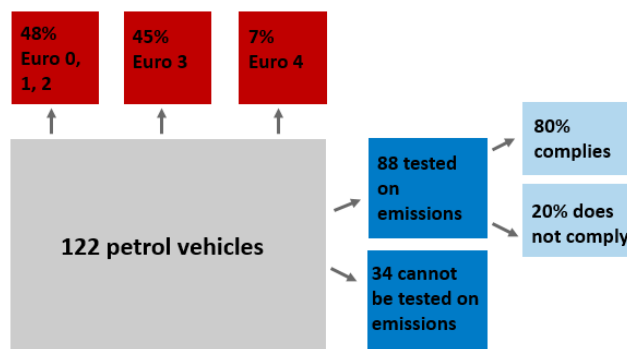


Figure 3.1. Summary of petrol vehicles tested

Of the petrol cars that we can test for emissions performance, around one out of five has an emission problem. Considering that the group of tested vehicles probably

⁴¹ Several of them suffer from leaking exhaust pipes.

are the better-quality cars present at the terminal, the emission performance of export petrol cars requires more attention. Below, we provide an in-depth description of our findings of removed emission control devices.

Removed catalytic devices

In nine cars, we observe a removed catalytic converter. We find that:

- they are older than seventeen years (date of entries between 1996 and 2001).
- most are Euro 2 emission cars, one Euro 1, and one Euro 3.
- they are from five different brands: BMW, Honda, Opel, Mercedes, and Hyundai.
- they are all destined for Benghazi and Khoums in Libya.
- they are all from German-registered vehicles except one.
- one car is registered in the Netherlands. This car still has a valid roadworthiness certificate, suggesting that the catalytic converter has recently been removed.
- in two cars, the catalytic converters have been replaced by straight exhaust pipes.



Catalytic converter replaced by a straight exhaust pipe, German BMW from 2001 (left picture) and a German Mercedes C180 from 2000 (right picture) © ILT December 2019



Removed catalytic converter from a German Opel Astra from 2000 (left picture) and from a German BMW 3181 from 1998 (right picture) © ILT December 2019

The business model of removing emission devices

We cannot establish who has removed the emission devices, when, and for what reason.

The phenomenon of removing emission control devices is not just typical for German vehicles. Catalytic converters are easy to steal. Regularly, reports on stolen

or removed emission devices are published in public media; these include both catalytic converters and Diesel Particulate Filters (DPF, we also refer to them as filters in this paper).⁴²



Police of Zwolle tweets about the finding of stolen emission devices, March 16, 2020

Based on studies between 2014 and 2019, TNO, a Dutch Organization for applied scientific research, finds that around 9% of diesel vehicles (cars and delivery vans) have no Diesel Particulate Filter or a malfunctioning one. One of the reasons is that the filter has been removed illegally.⁴³

There are several economic incentives for stealing emission control devices or not replacing a malfunctioning old emission device with a new functioning device.

- **Costs.** Diesel Particulate Filters have average life spans of 150,000 to 220,000 km. That is representative for used vehicle export to Africa (see figures 2.18, 2.20 and 2.21 on page 25 and 27). The replacement of a particle filter for a new one usually costs 1000–2000 Euros. It is possible to clean a filter, but the filter will usually not last very long after it. The replacement with an empty box in the exhaust pipe and manipulation of the electronic device, indicating the good functioning of the filter to the dashboard/ motor electronics, often costs between 150 and 300 euros.⁴⁴ A catalytic converter can last much longer. They are designed to last a lifetime, but usually, its functioning and capacity reduce over the years. A replacement catalytic converter may be needed. An original replacement part (OEM) costs up to 1000 Euros. Second-hand or universal/ imitation catalytic converters can replace dysfunctioning converters. They are much cheaper but also have shorter lifetimes and less capacity.⁴⁵

⁴² Examples: <https://nos.nl/artikel/2227593-autoverhuurder-bo-rent-sjoemelt-met-roetfilters.html>, <https://www.hln.be/auto/roetest-van-autokeuring-is-waardeloos-een-op-de-acht-euro-5-diesels-stoot-730-keer-meer-uit-dan-normaal-door-defecte-roetfilter-a7b4bd85/>

⁴³ TNO report, TNO 2020 R10006 "Follow-up research into the PN limit value and the measurement method for checking particulate filters with a particle number counter", 13 January 2020, p14 and <https://www.tno.nl/en/about-tno/news/2019/12/no-more-broken-and-discarded-soot-filters-on-dutch-roads/>

⁴⁴ Several companies offer their services online to remove or empty the Diesel Particulate Filter and modify the software.

⁴⁵ There is a huge second-hand vehicle part market. Second-hand emission devices often originate from car recycling processes. One example is <https://www.proxyparts.com/car-parts-stock/information/>. Companies selling second-hand vehicle parts, many of which are vehicle dismantling companies, also sell used catalytic converters. Used catalytic converters from 2003 may cost around 100-175 Euros. They are shipped abroad too. It stands out that different rules apply between countries. Vehicle dismantling companies in the Netherlands, for example, are allowed to remove catalytic converters from end-of-life vehicles and sell them for further use. This practice is not permitted for car recycling companies in Belgium. <https://www.febelauto.be/nl/auto-inleveren/een-afgedankt-voertuig-recycleren-hoe-werkt-dat>

- Revenues.
Catalytic converters and Diesel Particulate Filters generate revenue when sold for recycling. There are thousands of different types of emission devices on the market. Because of the presence of precious metals, revenues vary between 50 and 250 Euros based on size and composition.⁴⁶ This makes them popular among thieves and explains why people roam the market and cross borders to collect them. Besides theft, other practices include “flushing” emission devices from their precious metals, emptying filters and replacing it with concrete, and reprogramming the software.
In general, the bigger the car and engine, the more precious metals can be yielded from its emission device. Therefore, the German market, with its heavier cars, is an interesting market.

While our (limited) findings do not provide evidence that stripping catalytic devices from cars before export occurs structurally, we do believe export cars run a high risk. A valid roadworthiness certificate does not guarantee that the vehicle still has a functioning emission control device. After all, removal or dysfunction can happen after the vehicle has passed the roadworthiness test.⁴⁷

3.4 Emissions diesel vehicles

Euro emissions standards

Like petrol vehicles, the gaseous emissions from diesel vehicles have decreased over the last decades since the introduction of the Euro emission standards in Europe in 1992. Maximum limits for exhaust emissions from diesel LDVs are set for carbon monoxide (CO), combined mass of hydrocarbons and nitrogen oxides (HC+NOx), nitrogen oxides (NOx), and Particulate matter (PM). Since Euro 5b, there are also limits on Particulate Number (PN). The Euro emission standards applying to diesel LDVs and HDV differ slightly regarding years of introductions and maximum limits for exhaust emissions.⁴⁸

The introduction of Diesel Particulate Filters has become instrumental for car manufacturers to comply with the increasingly stringent exhaust limits set. Modern DFPs are very effective: a proper functioning filter can reduce the emission of soot with 95 to 99%.

For Euro 4 diesel vehicles, the maximum limit on Particulate Matter is 0.025 g/km. Car manufacturers do not need to install a DPF yet to comply with the standard. This changes with the introduction of Euro 5a (PM \leq 0.005 gram/km). However, there is not a single date. Most car manufacturers have introduced filters for LDVs since Euro 5a (Sept 2009). In some countries, however, car manufacturers have already introduced them for LDVs long before that date due to subsidies. This

⁴⁶ Usually, a catalytic converter contains platinum with rhodium or platinum with palladium. Catalytic converters from a German car usually yields more palladium compared to a Dutch car, which yields more platinum. A Diesel Particulate Filter contains only platinum, and there is less precious metal per kilo of ceramic, but a particulate filter usually has more kilos of ceramic.

⁴⁷ The first mandatory test is often within three or four years after the date of first registration. In some EU countries, test frequency of subsequent tests of passenger cars is every year. In other countries it is every two years. https://ec.europa.eu/transport/road_safety/topics/vehicles/roadworthiness-certificate_en

⁴⁸ For LDVs Euro 1: July 1992, Euro 2 January 1996, Euro 3, January 2000, Euro 4: January 2005, Euro 5a: Sept 2009, Euro 5b: Sept 2011 and Euro 6: Sept 2014. For HDVs Euro I: 1992, Euro II October 1996, Euro III, October 2000, Euro IV: October 2005, Euro V: October 2008, Euro VI: January 2013. The standards refer to new type approvals. A second date is specified for one year later, unless indicated otherwise, which applies to first registration (entry into service) of existing, previously type-approved vehicle models.

means that some Euro 4, or even a few Euro 3 diesel vehicles have a filter. On the Dutch market, Diesel Particulate Filters make their appearance for passenger cars in 2002. Diesel Particulate Filters have been used on a large scale since 2007 due to a fiscal stimulus.⁴⁹

For HDVs, progress is different. Some car manufacturers have introduced filters for HDVs since Euro V (2008) to be able to comply with the limits on PM. Others have not introduced them until Euro VI (2013) when the DPFs were the only way to comply with the limits on PM and PN.

The fact that a single date is absent for all diesel vehicles having a DPF complicates emission inspections. The date of entry/age of a vehicle does not provide sufficient information. For each vehicle, we first need to find out whether a DPF should theoretically be present following the information from the car manufacturer. This information should be available in the national vehicle register or the vehicle documents.⁵⁰

Our approach

During our field inspection, we are able to deploy an advanced test method developed for upcoming emission test requirements. Contrary to what we do for petrol vehicles, we do not aim to replicate the standard test method to check the emission performance of a diesel vehicle in the context of the periodic inspection. The standard test method, as described in Directive 2014/45/EU, measures the exhaust gas opacity.⁵¹ However, only those cars that produce incredibly high emissions fail this test. Also, modern diesel vehicles (Euro 5 and Euro 6), fitted with a DPF, can easily meet the high, outdated limits for smoke emissions, even without a particulate filter. In addition, the method does not detect defective or removed particulate filters. This is important since Electronic On-Board Diagnostic (EOBD) systems of the vehicle are not always able to detect DPF failures either. In case of a DPF removal, the engine management can be manipulated. The EOBD system will not detect the removal of the DPF.

For this reason, several countries, among which Germany and the Netherlands, have developed a new emission test method: the particulate counter (“deeltjesteller”). Within the next two years, it will become the standard test used



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⁴⁹ TNO report, TNO 2020 R10006 “Follow-up research into the PN limit value and the measurement method for checking particulate filters with a particle number counter”, January 13, 2020, p6

⁵⁰ In general, if it is registered that the particulate emission (“uitstoot deeltjes licht”) of the specific vehicle is 5 mg/km or lower, the vehicle has a DPF. In the Netherlands, this information is available in the (RDW) vehicle register. The register also records if the vehicle is equipped with a DPF (“af-fabriek roetfilter”).

⁵¹ DIRECTIVE 2014/45/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 3 April 2014 on periodic roadworthiness tests for motor vehicles and their trailers and repealing Directive 2009/40/EC

during the Periodic Roadworthiness Test. The test is executed at low idle speed, and PN emission is measured. The measurement determines whether or not a Diesel Particulate Filter is functioning/filtering sufficiently and takes less than a minute.⁵² Particle numbers are a good measurement for determining how effective a Diesel Particulate Filter is, as effective DPFs trap both smaller and larger particles.

Our findings

We have inspected a group of thirty-eight diesel vehicles. Twenty of them are LDVs: five passenger cars and fifteen light vehicles for the carriages of goods and passengers, like small vans. Eighteen vehicles are HDVs for the carriage of goods, like trucks.

Of all diesel LDVs and HDVs, a share of 63% (24 vehicles) has Euro 0, 1/I, 2/II, or 3/III emission standard. A share of 26% (10 vehicles) has Euro 4/IV, and 11% (4 vehicles) has Euro 5/V Euro standard.

Most diesel vehicles we can only inspect superficially as their battery is low or inaccessible. Moreover, because of their old age, they do not have a Diesel Particulate Filter. As a result, we have only been able to test five vehicles with the particulate counter. These five belong to the younger group of vehicles we test: four passenger cars and one truck. Of these five vehicles, four fail the test as they have a PN limit value of 1 million #/cm³ or more.⁵³ See appendix 1 for more details on the diesel passenger vehicles tested with the particulate counter.

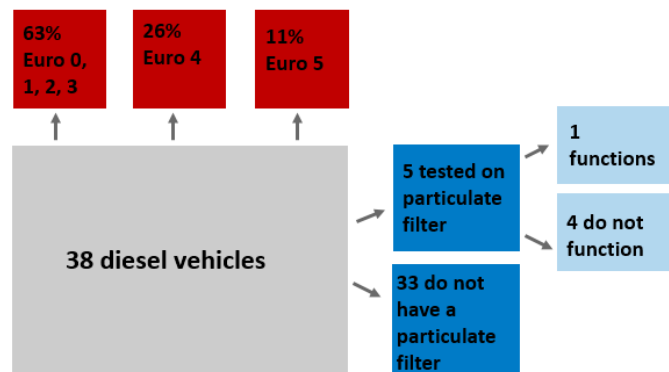


Figure 3.2. Summary of diesel vehicles tested

The only truck with a DPF we test is a Dutch-registered IVECO truck, a Euro V from 2012. Its mileage is 790,957 km. The truck is destined for Al Khoms, Libya. As the PN level was 2 million #/cm³, it failed the emission test.

⁵² TNO report, TNO 2020 R10006 "Follow-up research into the PN limit value and the measurement method for checking particulate filters with a particle number counter", January 13, 2020 and <https://www.tno.nl/en/focus-areas/traffic-transport/roadmaps/sustainable-traffic-and-transport/sustainable-mobility-and-logistics/improving-air-quality-by-monitoring-real-world-emissions/emissions-of-particulate-matter-from-diesel-cars/>

⁵³ When particulate counters will be used in the periodic roadworthiness tests PN limit values are 1,000,000 #/cm³ for Euro 3, 4 and 5a vehicles and 250,000 #/cm³ for Euro 5b/6 vehicles.



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Observations

It stands out that the diesel passenger vehicles with a Diesel Particulate Filter are all destined for Tema, Ghana, and are all Euro 4 and Euro 5 emission vehicles. The desk study also demonstrates that many of the exported Euro 4 vehicles go to Ghana. This is the likely result of a policy in Ghana to attract younger and better quality second-hand vehicles. We have only tested a limited number of diesel vehicles with Diesel Particulate Filters as most export diesel vehicles do not have them. Still, it concerns us that if they have a filter, they do no function.

As our sample group is very small, more information on this is useful, especially because things can evolve quickly in the future. At least two European countries will introduce the new emission test method soon. Hopes are high that the new test method will improve the urban air quality in European cities. Many diesel vehicles will probably not pass the new emission test. They will need to be taken off the road or have a filter repaired or replaced by a new one. In the Netherlands, around 1.2 million diesel LDVs will be tested with this particulate counter during the periodic roadworthiness test, probably starting in 2021/2022.⁵⁴ There will be many more in Germany. A Belgium study shows that with measuring the emissions with a particulate counter, one in eight Diesel Particulate Filters on Euro 5 diesel vehicles prove to be defective. Extrapolation to the Belgian fleet shows that 165,000 diesel vehicles are driving around that might fail the new test because of a defective or removed particulate filter.⁵⁵ Experts of TNO estimate that the introduction of the particulate counter reduces the average effective particulate emissions of diesel vehicles with particulate filters by 40-50% and reduces the total amount of particulate exhaust emissions of all current Dutch road vehicles by about 8%.⁵⁶

The better test method means that soon, several diesel vehicles from Germany and the Netherlands failing the test because of a removed or deficit DPF might flood the export market.

The seven-year-old Iveco truck that fails the emission test symbolises the efforts of European regulators that ban dirty diesel vehicles from its cities increasingly more. The city bans also affect relatively young diesel vehicles. They might end up in the West African countries even though these countries have recently decided to import younger second-hand vehicles only in their effort to attract cleaner vehicles. A certain age and Euro emission class do not always guarantee low emissions. Testing the emissions of export vehicles right before export could provide that guarantee.

⁵⁴ Another 700,000 diesel LDVs will not be subject to the new test method as they do not have a DPF.

⁵⁵ <https://www.hln.be/auto/roetest-van-autokeuring-is-waardeloos-een-op-de-acht-euro-5-diesels-stoot-730-keer-meer-uit-dan-normaal-door-defecte-roetfilter~a7b4bd85/>

⁵⁶ <https://www.tno.nl/en/about-tno/news/2019/12/no-more-broken-and-discarded-soot-filters-on-dutch-roads/>

3.5 Technical state of the vehicles

We aim to inspect vehicles on:

- braking systems
- steering systems
- fields of vision
- light installation, lighting equipment, and electronic components
- axles, wheels, and tires
- chassis and bodywork
- airbag
- emission system



Petrol vehicles

From the 122 petrol cars, we can inspect ninety-six. Twenty-six cars are not accessible because of closed doors or too dirty to enter, or they do not have a battery or working engine.

From the ninety-six inspected vehicles:

- 44% (forty-two vehicles) is without clear deficiencies
- 33% (thirty-two vehicles) have one deficiency
- 23% (twenty-two vehicles) have two or more deficiencies

So, a part of the petrol vehicles we are able to inspect is in reasonable to good technical state, but at least 56% would fail the periodic roadworthiness inspection. One reason for the latter is that we cannot inspect them as thoroughly as the inspection during a Periodic Roadworthiness Test. After all, no pit or lift is available.



Hyundai for Tema, Ghana, dirty and with an excessive stench (left picture) A Toyota Picnic from 1998 for Lagos, Nigeria, in good state (right picture)

We also find deficiencies in vehicles with a valid roadworthiness certificate ("geldige APK"). Deficiencies vary from minor to major ones. Minor deficiencies require a relatively simple repair or replacement, like:

- a defective wiper blade or headlamp
- no opening door
- no closing hood
- a loose bumper
- an absent silencer.

Examples of major, dangerous or more costly deficiencies are:

- an anti-lock braking system (ABS) malfunctioning: the warning device shows system malfunctioning in 6% of petrol cars with ABS.
- an insufficient tire tread.
- a corroded subframe.
- missing mirrors.
- broken coil spring seat.
- a rusted rear axle.

Also, one out of eight airbag systems present malfunctions. The airbag is non-operative, the system indicates a failure via the electronic vehicle interface, or the warning light is removed, indicating that the airbag system is turned off.⁵⁷ See some examples below.



A Renault, 1997 for Benghazi, with tires completely worn

⁵⁷ A number of one hundred and eight petrol cars have an airbag of which fifteen could not be checked as the battery or engine is not working. From the ninety-three vehicles inspected, eleven airbag systems are malfunctioning (12%).



A Hyundai Accent from 2001 for Benghazi, Libya with several deficiencies: loose battery, right front brake hose severely corroded, damaged belt (left picture). A Mercedes from 2000 for Benghazi, Libya with several deficiencies: coil spring seat left front torn, catalytic converter removed (right picture).



Opel Corsa from 2000 for Benghazi, Libya with rusted rear axle (left picture). Peugeot 406 from 2003 for, Lagos, Nigeria with dysfunctional airbag system (middle picture). A Mercedes Benz C180 from 2001 for Lagos with already activated airbag (right picture).

Two petrol cars are classified as waste. Export is prevented.



A heavily damaged car after an accident, a Nissan Micra from 2003 for Benghazi, Libya (left picture). A Honda Civic from 1996 for Lybia. The axles, wheels and tyres had several deficiencies (right picture).

Diesel vehicles

From the thirty-eight vehicles, we inspect thirty-three. Five vehicles are not accessible because of closed doors, their cabins are too dirty to enter, or they do not have a battery or working engine.

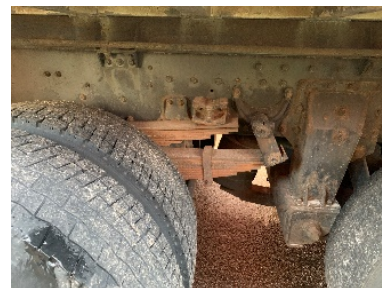


From the thirty-three inspected vehicles:

- a share of 52% (seventeen vehicles) is without apparent deficiencies.
- 21% (seven vehicles) have one deficiency
- a share of 27% (nine vehicles) has at least two deficiencies.

So, a part of the diesel vehicles we are able to inspect is of reasonable quality, but at least 48% would fail for the periodic roadworthiness test. One reason for the latter is that we cannot inspect them as thoroughly as the inspection during a Periodic Roadworthiness Test. After all, no pit or hoist is available.

Several of the trucks are old and have a lot of mileage on the odometer (600,000 km and more). Their overall condition can best be described as worn-out, rusty, and with a deteriorated interior. Despite this, technically, several trucks are in a reasonable state as its vehicle parts are easy to maintain and repair.



A MAN truck from 1994, for Lagos, Nigeria, frame in reasonable state

As with the petrol cars, identified deficiencies vary from minor deficiencies that would need a relatively simple repair or replacement to major and more costly deficiencies. See examples.



Ford Transit from 2006 for Tema, Ghana: auxiliary beam chassis incorrectly repaired, sills incorrectly welded



A Hyundai from 2003 for Benghazi, Libya, with malfunctioning airbag and with mileage registered as "illogical" in the vehicle register

A Volkswagen from 2002 for Tema, Ghana, several deficiencies: light units broken, back door cannot open, oil leak, defective wiper

Two diesel vehicles are wrecks. One cannot drive them. We stop them for export and order them to be dismantled. See the images below.



A Volvo from 2000, for Nigeria with many deficiencies: VIN unreadable, lights and battery removed, exhaust system incomplete, bumper missing, fuel tank missing, air tanks hanging loose, smooth tires



A Volkswagen bus LT3590 from 1988 for Lagos, Nigeria with many damages: left auxiliary beam 100% rust damage, shaft seriously deformed, heavy gasoline smell

Risk of manipulated odometers

Cross-border trade leaves an ultimate opportunity for fraudsters to manipulate the odometer reading. Sometimes, countries work together to combat this type of fraud. In the Netherlands and Belgium, odometer readings are registered centrally when the car is serviced and at each (periodic) test. This increases the chance to detect illogical meter readings. Agreements between the Netherlands and Belgium to exchange odometer readings of imported vehicles has led to a reduction in the occurrence of odometer manipulation between the two countries. This is not the case for trade between Germany and the Netherlands. In Germany, the central registration of odometer readings during (periodic) inspections has become mandatory only very recently. It will take years before a historical overview of odometer readings has been accumulated in a central registration. This is also the reason why the Dutch Vehicles Authority labels the mileage of a German vehicle imported into the Netherlands as “no judgement” in the vehicle register.

During our vehicle inspections, we note the mileage shown on the odometer. It strikes us that while most of the vehicles are very old, many mileages are suspiciously low.⁵⁸

While car owners may put only a few thousand km on their car annually, it is remarkable that quite a few of the export passenger cars we test have low or very low mileage compared to their age and known annual kilometre averages published.

⁵⁸ Examples:

- a twenty-one-year-old Nissan Micra with 63,710 km mileage (around 3,000 km per year)
- an almost twenty-four-year-old Hyundai with 77,945 km mileage (around 3,275 km per year)
- a twenty-one-year-old Mazda with 87,147 km mileage (around 4,100 km per year)



A Hyundai Accent from 1996 with suspicious low mileage. The catalyst device is absent, and the vehicle registration papers in the car are from another, younger Hyundai.

A Dutch passenger car typically drives around 13,000 km annually and a Belgian car around 15,000. A German car typically puts around 14,000 on the odometer.⁵⁹ Petrol passenger cars usually have lower annual mileage. In 2017, Dutch petrol cars have annual mileage of 10,529 km.⁶⁰

Further analysis of the vehicles inspected shows that specifically many of the German registered passenger cars have suspiciously low mileage. In reading the odometers of thirty-five German petrol passenger cars, we find that 89% (thirty-one vehicles) of them show less than 13,000 km per year on average.

In addition, comparison of the average mileage of the thirty-five German petrol passenger cars with the average mileage of the forty-nine Dutch petrol passenger cars reveals that:

- the annual average of all German registered cars is 9,727 km.
- the annual average of all Dutch registered cars (of which the mileage is judged as “logical” in the Dutch register) is 12,879 km.

The difference is significant. We also come across cases where cars have been imported in the Netherlands from Germany and continue to drive in the Netherlands. Consequently, they have a label of “no judgement” in the Dutch register. We observe that some have come in with a “typical rolling back mileage” of just below 100,000.

Our findings indicate that there is a particularly high risk of odometer manipulation with German export cars.

This finding is in line with the outcome of a Dutch study conducted by the Netherlands Vehicle Authority (RDW) on odometer fraud.⁶¹ The study demonstrates that at least one in five cars imported from Germany has a manipulated odometer. This figure is an under-estimation. The probability of detecting odometer

⁵⁹ CBS, “Transport en mobiliteit 2016” P 56.

⁶⁰ ACEA, “Vehicles in Use Europe 2019” p.19

⁶¹ RDW, Vereniging Aanpak Tellerfraude, July 2018 “Odometer manipulation regarding imported vehicles from Germany”, <https://www.aanpaktellerfraude.nl/importautos>

manipulation is minimal for cars imported from Germany.⁶² When German registered vehicles change hands and cross borders, the new buyer has limited means to check if the mileage is correct.

The victim of odometer manipulation is primarily the private buyer who buys a second-hand vehicle in good faith, not knowing that the vehicle has driven far more kilometres than shown on the dashboard. The average damage of a rolled back odometer is estimated to be €1,500 per vehicle. The damage of odometer fraud comprises:

- reduced value of the vehicle, because the number of kilometres driven largely determines the price of the vehicle.
- higher level of wear and tear on parts of the vehicle. As a result, the vehicle will be at the garage sooner, and costs for maintenance and repairs will be higher.
- increased risks concerning road safety. Because of the actual number of kilometres driven, the condition of the vehicle may be very different from what the odometer reading suggests.⁶³

3.6 Identification of vehicles

Tracing the unique VIN and the adequate noting down of the seventeen characters are essential to identify the vehicle in the Dutch vehicle register. In the case of a foreign vehicle, we aim to find it in the European car and driving license information system EUCARIS⁶⁴. Furthermore, we have information on the vehicles from customs export declarations and information the inspectors collect from paperwork sometimes present in the vehicle. This way, we can collect more information on each vehicle, its history, and its status.

Reflection on the joint information provides us with some crucial insights into the issues a possible future policy regulating the trade of second-hand vehicles to African countries needs to cover.

- Customs export declarations do not always mention the VIN. None of the vehicles exported to Libya, for example, carry this information or they merely mention the last six numbers, which is not enough to identify a vehicle. Most vehicles exported to West Africa do mention the VIN at the Customs export declaration. This confirms the findings of our desk study. As this is unique information for a vehicle, it is important to make it mandatory for exporters to include the complete VIN in customs export declarations. This facilitates inspectors in a paper check on the vehicles: confirm that the vehicle is not stolen, has an export status etc.

⁶² The study concludes that it is difficult to establish odometer manipulation based on the car itself, even for professionals who work with cars on a daily basis. For a consumer, it is virtually impossible to determine odometer manipulation if the odometer has been rolled back carefully. The estimates of odometer manipulation are an underestimation of the actual odometer manipulation, simply because not every odometer manipulation can be recognized.

⁶³ RDW, Vereniging Aanpak Tellerfraude, July 2018 "Odometer manipulation regarding imported vehicles from Germany", p13,59 <https://www.aanpaktellerfraude.nl/importautos>

⁶⁴ EUCARIS is a cooperation between national vehicle registration authorities of several European countries. It is started in 1994 to fight international vehicle crime. Since the development of the EUCARIS system, the number of countries using the EUCARIS technology and the number of services offered has been growing constantly. Through EUCARIS, we have been able to identify vehicles registered in one of the following fifteen countries: Belgium, Cyprus, Estonia, France, Germany, Italy, Hungary, Latvia, Lithuania, Luxembourg, Norway, Romania, Slovakia, Sweden, and the UK.

- Papers in the car or vehicle information in the customs export declarations do not always match the real vehicle identity. We find several examples of this.⁶⁵ Physically checking the VIN is essential in identifying the vehicle.
- For four of the one hundred and sixty export vehicles tested, we find an inaccurate status in the vehicle register.⁶⁶ These cases suggest a flow of vehicles with “fictitious dismantling”.



A Mitsubishi Colt from 1994, for Al Khoms, Libya, price 750 Euros, has a dismantling status in the vehicle register

We also observe this in our desk study. A practice of “fictitious dismantling” suggests that end-of-life vehicles may be exported in violation with the EU Waste Shipment Regulation. It is forbidden to export end-of-life vehicles to African countries unless they are decontaminated first. These are just a few cases in a small sample group. Nevertheless, if four out of one hundred and sixty vehicles (2.5%) is representative of all vehicles registered for dismantling in a year, it would concern thousands of vehicles.⁶⁷ More research and follow-up inspections are useful to find out whether:

- they are falsely declared with mal intention⁶⁸.
- it concerns a substantial flow.
- it concerns cross-border leakage flows too ⁶⁹.

⁶⁵ A Hyundai from 2001 according to the VIN not mentioned in the Customs declaration is actually a Hyundai from 2004 when we check the registration through the VIN that we note during the inspection. It can be a mix up of two Hyundai cars by the car dealer.

A Mercedes truck from Poland for Lagos, Nigeria, price 4000 Euros. Information present in the vehicle indicates that the vehicle is from 1995. The custom declaration indicates that the vehicle is from 1991. Because the vehicle came from Poland, a country that does not yet share its vehicle registration information with other countries, we cannot identify the vehicle through the VIN noted.

Registration certificate in the vehicle says it is a Hyundai from 2004, Euro 3. Through the VIN we note, we discover that it is a Hyundai from 1996 and that it must be a Euro 1 or 2 car. The Hyundai is destined for Benghazi, Libya. It also has suspiciously low mileage and the catalytic convertor has been removed.

⁶⁶ Two vehicles have a dismantling status. In addition, another two vehicles inspected come into the terminal without an export status.

⁶⁷ In 2018, for example, a number of 247,663 vehicles are dismantled. A share of 2.5% makes over 6,000 vehicles.

⁶⁸ Old cars are delivered to a vehicle dismantling company. The car dismantling company deregisters the vehicle with the appropriate authority (in the Netherlands, this is the RDW). The customer receives a release of liability form and the car an ‘ORAD’ listing: An Online Registration of Automotive Dismantling.

⁶⁹ This would be the case if a vehicle is deregistered in Germany for dismantling but then turns out to be exported from the Netherlands. Alternatively, if a Dutch vehicle is deregistered in the Netherlands for dismantling but is then exported from the port of Antwerp, for example. Studying this phenomenon requires linking and comparing export data from Customs and vehicle register information from different countries, starting with Belgian, Dutch, and German data, for example.



This truck from 1994 for Lagos Nigeria, price 5,750 Euros has been dismantled in 2017 according to information in the vehicle register

- We cannot identify all vehicles through the VIN noted. We have several examples.⁷⁰ Reasons for this are because they are not registered in one of the fifteen EUCARIS countries, or if they have been, the information might have been cleared from the system if the vehicle has been deregistered a long time ago. To identify all vehicles, it is useful to use a reliable tool or system on top of EUCARIS.
- Several export vehicles still have plate numbers fixed to them or present in the vehicle, while they should have been handed in or cut in half at the time of deregistration for export. The RDW has followed up on these cases with the companies responsible for these omissions.

⁷⁰ An example is a Chrysler PT Cruiser from 2002 for Benghazi. Another example is a BMW 3181 from 2001 for Benghazi. Papers available in the car show deficiencies discovered in a relatively short time and few mileage before car is sold for export: flexible brake hoses porous and suspension system, damaged springs. These concern deficiencies 1.1.12e and 5.3.1b mentioned in Directive 2014/45/EU that sets out the technical standards for vehicles inspection by EU countries.

4 Conclusions

4.1 Results

The results of our desk study show that the majority of the used vehicles exported from the Netherlands to North and West Africa are old and below the Euro 4/IV emission standard, and do not have a valid roadworthiness certificate.

An in-depth look, including the results of the field inspections too, reveals that:

General

- Libya, Nigeria, and Ghana import most of the used vehicles exported from the Netherlands.
- An estimated share of 40% of vehicles exported from the Netherlands to African countries has foreign registries (mainly German).

From the perspective of recipient countries

- Over 80% of the used vehicles currently exported to West African countries will soon no longer be acceptable due to stricter environmental regulations of the recipient countries in West Africa. They are too old and do not comply with the minimum emission standard of Euro 4/IV.
- The majority of export vehicles to West Africa have an emission class 3/III or lower.
- The majority of export vehicles to African countries are older than ten years. The peak is between sixteen and twenty years. An exception is Morocco, where the mean age of LDVs from the Netherlands is 4.7. Ghana too receives somewhat younger vehicles, where the mean age of LDVs from the Netherlands is 13.6.
- At this moment, used vehicles go to African countries while not complying with the import criteria those countries have. On the other hand, when a stricter policy is established, we see that this influences the age of imported vehicles. Younger and higher Euro emission class vehicles are exported to Morocco and Ghana, for example, most likely as an effect of its import policies.

Export vehicle almost identical to end-of-life vehicle

- The desk study shows that the group of vehicles exported to West Africa is quite similar to the group of vehicles dismantled in the Netherlands concerning age, euro emission class, and mileage. Both groups of vehicles have a peak in age between sixteen and twenty years and a peak in emission classes 2 and 3.
- Vehicles exported to North and West Africa are the cheapest (in Eurocents per kilo) compared to other regions to which used vehicles from the Netherlands go. In this respect too, an export vehicle to Africa approaches an end-of-life vehicle that is recycled in the Netherlands. Libya and Nigeria receive very low-price vehicles. A quarter of the vehicles going to these top 2 destination countries in 2017/2018 have a price of below 50 Eurocents per kilo.

Technical state

- We cannot inspect a large number of export vehicles to Africa or only superficially due to an empty battery, closed doors or a dirty cabin.
- The desk study shows that most used vehicles do not have valid roadworthiness certificates at the time of export to African countries. Part of the tested export vehicles is in a reasonable technical state. Around half (rough estimation) of the tested export vehicles would not pass the Periodic Roadworthiness Test. This percentage might be higher as a pit or a lift is not available to perform a complete inspection.
- A vehicle with a valid roadworthiness certificate can also have technical or emission deficiencies due to events happening after the last inspection. Old vehicles can end up on the export market due to defects. There is also a risk that emission systems are missing or not functioning at the time of export vehicles.
- The majority of exported vehicles to the top destinations in Africa have a mileage of over 200,000 km. HDVs have higher mileage than LDVs. The LDV vehicles with high mileage go to Nigeria, The Gambia, Sierra Leone, and Burkino Faso. The vehicles with relatively lower mileage (a peak of just below 200,000 km) go to Morocco, Ghana, and Ethiopia.
- Export vehicles (mainly German) run the risk of manipulated odometers. Vehicles with reversed odometers usually have more wear and tear and require more maintenance than expected based on the odometer reading.
- Of the tested vehicles, four vehicles for export are classified as waste. The vehicles are sent for recycling.

Emissions

- From the tested petrol cars (eighty-eight), around one out of five does not pass the emission test. This percentage might be higher because we have only been able to test the starting vehicles in our sample group, and the sample group probably concerns the better-quality cars present at the terminal. Petrol cars run the risk that the catalytic converter has been removed or does not function.
- A share of 86% (thirty-three vehicles) of the inspected export diesel vehicles does not have a particulate filter due to their old age. If they have them (five vehicles), they do not function properly, except for one. As the sample group of (young) diesel vehicles is very small, more inspections are useful.
- A Euro 4/IV or higher vehicle does not always guarantee lower emissions. The physical checking of the presence and functioning of emission devices is essential.

Other

- There are often irregularities in the export of vehicles to African countries. A group of export vehicles have an incorrect status in the vehicle register: recycling. This may indicate illegal waste exports. More inspections are needed to verify if this is done with mal intentions. This leakage flow might also occur between the Netherlands, Belgium, and Germany, but we have not investigated this.
- Some export vehicles to Africa concern vehicles that have been reported as stolen in the Netherlands.
- Paperwork collected from individual vehicles regularly indicates conflicting information. Making it mandatory to provide the VIN with a customs export declaration and physically checking the VIN benefit the identification and traceability of export vehicles. Even with a VIN, tracing the vehicles proves

to be difficult sometimes, because not all national vehicle registers can be accessed.

4.2 Observations

When we examine our findings against some external trends and developments in EU policies, the following observations arise:

- ECOWAS countries have decided that as of January 1, 2021, they will only import used vehicles with a minimum Euro 4/IV emission standard. Considering this, it is noteworthy in our findings that the vast majority of the used vehicles (more than 80%) currently exported to these countries will not meet their future import criteria. They are too old and below Euro 4/IV emission standard. Moreover, several emission control systems are not present, functioning, or removed. Currently, there is no EU-Africa-coordinated and effective approach to check vehicle quality and stop unwanted practises.
- Because vehicles move so easily between countries, the patchwork of different national rules is not helpful in getting the “right” vehicles in the “right” place. Our study shows that many used vehicles do not comply with import rules of the countries to which they go. Harmonisation of policies between European and African countries/regions is crucial. In 2020, UNEP starts a new project with several partners to improve the fleet of vehicles across Africa regarding safety and emissions by improving the quality of imported vehicles. The new ECOWAS requirements play an important role in the elaboration of the project.
- The ECOWAS countries have made these decisions primarily from the perspective of improving the emission performance of their vehicle fleet and the air quality. A positive side-effect is that importing better-quality vehicles also promotes road safety and reduces climate emissions. Soon, Germany and the Netherlands will start using the particulate counter. There is an imminent risk that diesel vehicles that fail the Periodic Roadworthiness Test because of this will flood the export market to Africa. They are relatively young and thus within the import criteria of ECOWAS countries, but with high emissions. Without additional measures, these diesel vehicles will cause polluting emissions in African countries, and they, therefore, do not contribute to the goal of African countries to move to a cleaner vehicle fleet.
- We observe that our inspections based on the EU Waste Shipment Regulation (“EVOA”) currently only halt the worst quality vehicles: when they are wrecks. From every hundred vehicles lining up for West Africa, perhaps one or two vehicles are halted by applying the rules of the EU Waste Shipment Regulation. In contrast, perhaps eighty vehicles are soon no longer welcome in West African countries. To conclude, we see a large gap between the vehicles we currently stop as “waste” and the large numbers of vehicles exported from the Netherlands to Africa that are soon no longer acceptable in fifteen West African countries. As the European Commission will evaluate and revise the EU WSR and the ELV Directive in 2020/2021, this provides opportunities to close this gap further. For example by clarifying and objectifying the criteria under which a used vehicle can be distinguished from waste.
- According to the European End-of-Life Vehicle Directive from 2015, all member states of the European Union are to reuse at least 95% of the weight of all end-of-life vehicles. The objectives of the ELV Directive currently do not cover used vehicles exported to non-OECD countries, such

as African countries. It is unclear how the export of used cars to countries without a proper structure for disposal and treatment of end-of-life vehicles compares to the extended producer responsibility and corporate social responsibility of Dutch car importers. Our desk study indicates that a significant part of the used vehicles exported to Africa is often very old and very similar to end-of-life vehicles recycled in the Netherlands. The “leakage flow” to Africa involving uncontrolled treatment of vehicles causes environmental harm if hazardous liquids or other hazardous substances leak into the environment and causes related injuries to the health of the people handling such materials inadequately. There is also a risk of losing secondary raw materials.

4.3 It is essential for countries to work together

We have no reason to assume that the issues encountered during our three-day inspections are typical for the export vehicles in this one terminal in the port of Amsterdam. For example, in the same week of our inspections, Dutch customs have stopped another wreck queuing in another Dutch terminal for export to Africa. Besides Amsterdam, other common Ports of Loadings for used vehicles in Europe with Africa as its destination are Antwerp, Hamburg, Tilbury, Le Havre, Bilbao, Leixoes, Lisbon, Marseille, Valencia, Sète, Genoa, Livorno, and Salerno. In 2017, around 220,000 vehicles are exported from the ports of Belgium, the Netherlands, and Germany to African countries. In 2018, this number is around 236,000.⁷¹

As the number of used vehicles (including vehicles with Dutch registries) exported from the terminals in Antwerp and Hamburg to African and other countries in the world is high, this puts much pressure on the inspection capacity in these ports.⁷²



Wrecks from the US waiting for loading in the port of Antwerp with Lagos, Nigeria as its destination © ILT October 2019

⁷¹ Based on UN Comtrade: commodities 8703 and 8704. <https://comtrade.un.org/db/mr/rfCommoditiesList.aspx?px=H1&cc=8703>

⁷² In 2018, for example, 1.8 million vehicles are exported from Belgium, including the exports overland. Based on UN Comtrade: commodities 8703 and 8704. <https://comtrade.un.org>

Vehicle ships and RoRo carriers load vehicles on almost a daily basis. Antwerp functions as the central hub for the region. Vehicles are brought in overland from Belgium and many nearby countries, such as Germany, Poland, France, the Netherlands, and Switzerland. In addition, used vehicles destined for the smaller or less regular visited ports in Africa are first shipped to Antwerp, where they change carrier. In 2017 and 2018, around 38,000 vehicles leave Antwerp each year with Africa as its destination.⁷³



Vehicle-carrying trucks loaded with used vehicles constantly entering terminals in Antwerp
© ILT October 2019

As vehicles easily cross borders, the EU countries must work together if they want to control the export of used vehicles to Africa and to avoid that export flows will simply shift from one port to the other.

We have therefore provided input to our Ministry of Infrastructure and Water Management, which is providing input for the evaluation and revision of relevant EU legislation by the European Commission in 2020/2021. In addition, the ILT has shared the findings of the study with UNEP, which is developing an international program called “Safer and Cleaner Used Vehicles for Africa”.

⁷³ Based on UN Comtrade: commodities 8703 and 8704.
<https://comtrade.un.org/db/mr/rfCommoditiesList.aspx?px=H1&cc=8703>

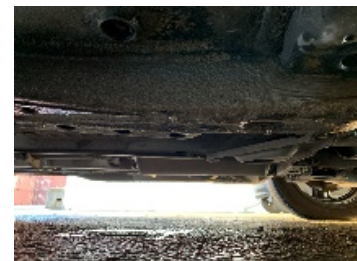
Appendix A - Diesel passenger vehicles tested

Below are more details on the diesel passenger vehicles tested with the particulate counter.

- From the four tested passenger cars, only one had a sufficiently working DPF. This concerns a Euro 4 car from 2008. The MERCEDES-BENZ C200 CDI is destined for Tema, Ghana. Its mileage is 392,811 km. The measurement of 600,000 $\#/cm^3$ indicates that the DPF works but not perfectly. The reason is probably that this is one of the earlier filter models.



- One of the failing passenger cars is a Dutch-registered Skoda Fabia, a Euro 5 diesel passenger car from 2011 destined for Tema, Ghana. Its mileage is 302,625 km. The PN level is 1 million $\#/cm^3$. The Electronic On-Board Diagnostic system also detects a failure.
- Another failing passenger car concerns a German registered Opel Astra from 2009, a Euro 4 car destined for Tema, Ghana. Its mileage is 286,486 km. The PN level is 1.4 million $\#/cm^3$.



- A last failing passenger car is a Dutch-registered Opel Astra station wagon from 2008, a Euro 4 car destined for Tema, Ghana. Mileage is 320,992 km. The PN level measured is 3 million $\#/cm^3$.





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